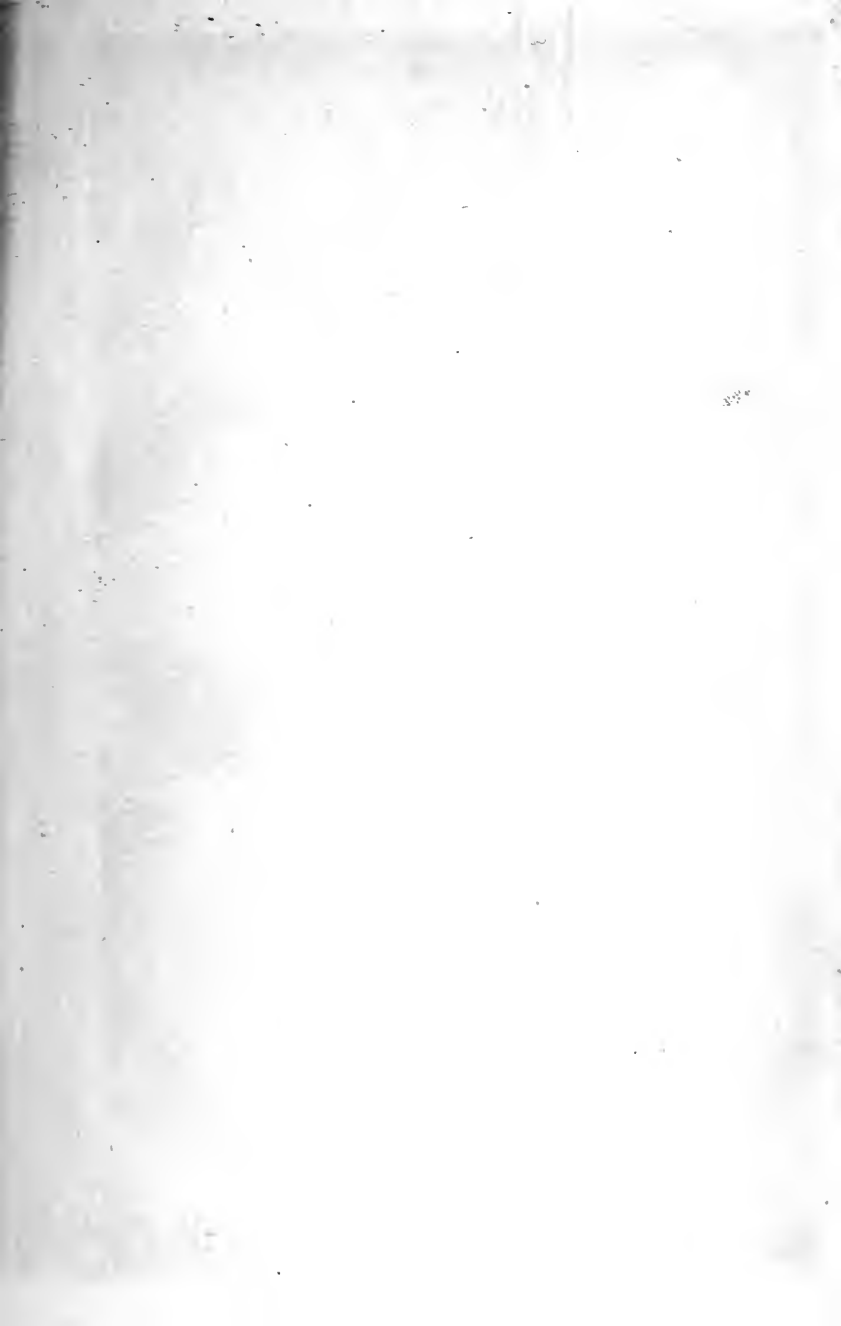


ILLUSTRATED MANUAL
OF
HAND & EYE TRAINING
ON EDUCATIONAL PRINCIPLES



BY
DR. WOLDEMAR GOETZE







HAND AND EYE TRAINING

ON

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ILLUSTRATED MANUAL

OF

HAND AND EYE TRAINING

On Educational Principles

*A TEXT-BOOK FOR MANUAL TRAINING IN
CARDBOARD-WORK, CARPENTERING, CHIP-CARVING
METAL-WORK, MODELLING, ETC.*

(

BY DR. WOLDEMAR GOETZE

DIRECTOR OF THE TEACHERS' TRAINING COLLEGE OF THE GERMAN
ASSOCIATION FOR BOYS' MANUAL TRAINING

VICE-PRESIDENT OF THE SLOYD ASSOCIATION OF GREAT BRITAIN AND IRELAND
AND OF THE SLOYD ASSOCIATION OF SCOTLAND

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TO THE
GERMAN ASSOCIATION FOR BOYS' MANUAL TRAINING

THIS BOOK IS DEDICATED

WITH THE TRUE AND EARNEST REGARD

OF

THE AUTHOR

P R E F A C E.

—♦—
Bilde das Auge, übe die Hand,
Fest wird der Wille, scharf der Verstand.

[When eye and hand you deftly train,
Firm grows the will and keen the brain.]

I HAVE long felt a growing desire to review the ideas and experiences which have been evolved during the recent movement in favour of Manual Training for boys. The spread of this new educational creed demonstrates the need for some such short but lucid account of its main articles. A statement is needed of the educational value of manual work, of the reasons for and against its adoption, of its historic evolution, and of the practical working out of the principle upon which it is based. Further, the bearings of the subject with regard to teachers and pupils, the different kinds of work and tasks to be set, the materials, tools, and fitting-up of workshops, all these things require discussion. There remains, moreover, for consideration the connection between Manual Training and the ordinary forms of instruction, and the position

of the former in our various schools and Educational Institutes.

From its earliest beginnings I have taken part in the propaganda in favour of Manual Training. I have gathered experience at Leipsic from instruction given to pupils and teachers there, and in the Teachers' Training College of the German Association. I have furthermore found it necessary to keep in touch with the progress made in the theory of the subject, and may, I think, be fairly considered qualified to attempt a brief sketch of the more prominent features of this new domain.

I trust that the present volume may meet with the approval of those who are already enlisted in the cause of Manual Training. Let me also hope that it may prove of service to those who wish to become recruits in its ranks. German thought on this topic of educating the young in and through manual work is now being diffused throughout England. It is a pleasant proof that there are still matters of human interest in which nation may lend to nation a helping hand across the boundaries of states. I do not, however, in any way mean to suggest that the teachers of Great Britain may be saved the trouble of creating for themselves a system of Manual Training suited to the wants of their native land: for every nation must gather and husband its own experience. But those English teachers who have been already influenced and stimulated by the Swedish Sloyd, may possibly derive benefit from some acquaintance with German Manual Training, based as it is upon a broad educational foundation. It were indeed

pedagogic gain and achievement enough if I could convince such teachers of one point—that is, that manual work is not for older and bigger boys only. I would also gladly persuade my readers that *wood* is not the one and only material predestined by nature for our purpose, but that there are other and more suitable materials, the treatment of which may afford instruction alike to older and to younger children.

I hasten, then, to start this book on its travels through England, the land with which we Germans have most intellectual affinity. I send it as a messenger of hearty greeting to many friends who dwell across the sea.

My highest aim will be realised if I can convince the whole body of English teachers that Manual Training is a valuable means of education; that it is not intended to serve as a kind of premature apprenticeship to any trade; and that the friends of Manual Training pursue a higher object than the mere increase of skill and dexterity obtained through hand and eye training. They look indeed upon manual work, connected as it is, so to speak, organically with mental activity, as a means by which to secure the complete and harmonious education of a child.

This book has been inspired by a deep love for the young. Its mission is to impress on the instructors of the rising generation the right view of Manual Training, a subject often misunderstood or misconstrued—an end which I trust it may successfully accomplish.

Work towards perfection, do battle for the truth, bring forth good fruit in training a healthy generation, susceptible of beauty, fit to labour, with a will strengthened to be the ready implement of a clear and highly-developed mind. This is the Valediction and *Envoi* to my book.

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MANUAL TRAINING.

I.

THE NATURE OF MANUAL TRAINING.

MANUAL TRAINING is an extension of the means hitherto employed for the education of the young: it seeks to utilise a child's innate desire of activity to the developing of its bodily and mental powers by systematic exercise.

The condition that the child shall itself be active, that by observation and experiment it shall contribute to its own education, is the essence of our system, and exhibits its most striking contrast with the pedagogy which works from without rather than from within. Other demands are that the hand must be skilled, the eye trained to see aright, the senses of form and colour developed, the tension of the muscles increased. But these are subsidiary aims. They are but the prismatic colours, whilst the element of self-activity is the illuminating ray. In this requirement all friends of the cause agree, whether they swear by the name of *Slöjd* or *Husflid*, *Travail Manuel* or Manual Training, *Arbeitsunterricht* or *Handfertigkeitunterricht*. Some may entrust the teaching to the schoolmaster, others to the artisan; some may consider exercises to be all that is necessary, others prefer objects of actual utility; these objects,

again, may be such as are employed for children's games, for their instruction at school, or for domestic purposes; but all authorities require the child *to busy itself*, that in so doing it may exert its mind, use its senses, and, in overcoming physical difficulties, develop its mental and bodily powers.

II.

REASONS FOR MANUAL TRAINING.

A. REASONS BASED ON HISTORIC DEVELOPMENT.

It is a well-known natural law that the individual follows the same stages of development as the stock to which he belongs. In every series of forms the highest form must repeat and contain within it all others. 'The series of form-conditions through which an animal passes in its progress from germ to maturity is a repetition of the series of form-conditions which its progenitors have gone through whilst progressing, generation by generation, to their present state of development. In brief, the story of individual development is a repetition of the history of the race; or, to transfer this law to the sphere of psychogenesis, the spiritual development of the individual is a repetition of the historical development of the human mind in the succession of its spiritual progenitors; formulating the principle for man in his highest stage of mental culture, we would say, the spiritual development of cultured man is a repetition of the history of culture.' (Prof. Dr. G. Jäger, *Ausland*, 1871, No. 41.)

The history of the development of humanity shows us more plainly than anything else the great educational value of work. What stage of development would our present culture have reached had our ancestors contented themselves

with the contemplation of the world around them? What should we have known about nature and the laws of its phenomena, if we had only contemplated them? What should we know about the structure of wood, its density, specific gravity, sectile properties, combustibility, etc., had we limited our examination of trees to ocular contemplation? How far would medical science have progressed had there been no such thing as anatomy? *Work* then has been the most important means of educating humanity; through it we have gathered experience. Now, Manual Training is nothing else than the pedagogic application of the law which says that individual development means repetition of racial development. We wish to educate the child by practical work exactly as humanity has grown and developed under the educating influence of work. The object is to acquaint the child gradually, through its own work, with the world of practical experience, so that it shall learn and become familiar, through its own observation, with the properties of various plastic substances, and be taught the use of certain simple tools by itself handling and applying them. The child is not to work for money, nor to prepare itself for a certain trade, but is to become acquainted with the rudiments of work by its own energising, and be inducted, step by step as its powers grow, into new and various fields of labour.

It follows, moreover, from this law of the parallelism of the development of the race with that of the individual, that the hand of the child must be trained in various ways, for the benefit of the child's mental development. The use of the hand is of the very greatest importance in the history of the development of humanity.

Professor Marshall, in his anatomical and physiological treatise on the Human Hand (*Bericht*¹ of the *Lehrerbildungsanstalt* for the year 1881), proves irrefutably that

¹ *Bericht der Lehrerbildungsanstalt des Deutschen Vereins für Knabenhandarbeit*, cited hereafter as *Bericht*, etc.

when the work which the hand and the foot have each to do has been clearly specialised (the foot being used for walking only, the hand for work and manipulation), then, and not till then, can human life be in any way described as superior to that of the lower animals. Professor Marshall shows the influence which this division of labour has exercised upon the development of the hand, upon the nerves which communicate directly with the brain, and finally upon this central organ itself, and through the brain upon human thought and reason. The training of the hand will have the same influence upon the development of the individual, so that those who promote the exercise of this hitherto neglected but all-important organ, are rendering service to the cause of human culture in general.

It is true that, with the progress of the world, much work is now done by machinery which was formerly done by hand, but such work is only mechanical. The human hand must not for all that be allowed to remain idle, and to lose its cunning; it is rather ~~thus~~ set free to apply itself to higher and more delicate tasks. Wholesale reproduction is the function of machinery; the province of individual effort must always belong to the hand, which is now, as ever, the chosen implement of the mind in its onward striving towards perfection.

Let us therefore apply to the education of the child this natural law, and at the age when practice and training bear the best fruit, let us exercise the hand in manifold and varied ways.

B. REASONS FOR MANUAL TRAINING BASED ON THE HISTORY OF PEDAGOGICS.

The progress made under the influence of observation and experiment in the methods of instruction has given a strong impetus to Manual Training. There are two ideals in education, Humanism and Realism, contending in the arena

for pre-eminence. With the revival of ancient learning by the Humanists, there arose a system of education founded upon books. These were in their opinion the only means of education—grammars and dictionaries (not the senses, nor observation, nor experience) the only tools at its disposal. Thus there arose a caste of scholars, buried in their books and estranged from the world, who thought themselves far above the common folk, while the people rewarded them with ridicule and scorn as mere wrong-headed pedants.

That even natural history, so far as it could be studied in the classical authors, such as Aristotle, was regarded as a matter to be treated verbally only, without any connection with reality, is a proof of the domination of verbalism.

There came a time, however, when the latter no longer swayed the intellectual world. It is to the development of natural science that mankind owes this revolution. This science rests upon observation, and has rightly been called 'experimental science.' During the last two hundred years it has wrought the greatest change ever experienced in the history of mankind, and it was therefore bound, with its grammar (mathematics), to take a triumphant position in any true system of instruction. Henceforth it was no longer books alone, but observation and experiment, which became the means of instruction, and it was in the universities that the change first became operative. Metaphysical speculation is replaced by explanatory natural science, philosophical theories by observation, and from such intuitive instruction we proceed to practical work. As Goethe says in *Faust*, 'What thou'st inherited from thy forefathers, *acquire't* thyself, that thou mayst say 'tis thine!' Nothing is actually ours but what we win for ourselves—a truth which applies to the acquisition of mental as well as of worldly treasures.

That which the progress of science accomplished, has its

pedagogic counterpart in the educational maxims of to-day. Schools follow the lead of the great world of culture, and the working of master minds is reflected in the class-room. It was Pestalozzi who headed the struggle against verbalism, to secure for children instruction through observation and intuition. His earnest pleading and precept won the day. Doing battle for '*Intuitive Instruction*,' he broke down the old routine of mechanical teaching and reformed elementary education. Not only did he thus open out a new and wide field of instruction through intuition, but every department of education has been affected by the pervading influence of his motto, 'Teach by means of intuition.' This intuition for which Pestalozzi pleaded was not merely a new kind of instruction, but a principle transforming the whole science of pedagogy.

Manual Training is in reality nothing but an advanced and gradual development of '*intuitive instruction*.' A child while engaged in hand-work is never free from the necessity for intelligent observation. Picture object lessons, on the other hand, may after all be but verbalism in a new form, and may fail to arouse the child's deepest interests. Pestalozzi could not from his own nature and the circumstances of his life foresee the consequence to which his pedagogical reform tended, but he clearly showed the way to it. Fröbel, a pupil of his, was the first to follow his lead; and what Fröbel did for early childhood, that we now continue for boyhood's school years. This is the essence of the effort to promote manual work for boys. Thus, to experimental science is added experimental instruction; and in exactly the same way as '*instruction by intuition*' introduced a two-edged reform into education, both as a new principle and as a branch of instruction, so has the demand for self-activity in the child a double influence. This demand is most efficiently met by Manual Training, for here the principle appears as it were condensed and specialised. The two somewhat older departments of instruction—drawing and

gymnastics—are based on the same principle; for they are inconceivable without the child's mental and bodily participation. In order to carry on gymnastics in the manner of the schools, one might have to begin by propounding theoretical reflections upon the body and its actions, or by illustrating from history, perhaps, the gymnastics of the Greeks. Fortunately, gymnastics originated outside scholasticism, and sprang from the heart of a people full of life and vigour, anxious to contribute to its own defence. Father Jahn, when practising gymnastics on the 'Hasenheide' with his boys, never troubled himself about the theoretic school, and the theoretic school was rather late in taking any notice of his gymnastics. (Nor is drawing conceivable without the child's participation, and without training, especially of the eye.) It is no good resorting to æsthetic-philosophical reflections; the child must look for itself, and its drawing is nothing but the voucher which it gives for what it has received by sight. Now, manual work enters as a third into the union, and takes its place between gymnastics and drawing, being, in fact, a new form of education through self-activity.

Whilst it is in Manual Training that the idea of employing the activity of the child finds its most marked expression, yet the same principle extends its influence to other subjects, and permeates above all the sciences which deal with real things. The revolution has operated in a downward direction from the universities, our highest educational institutions, to the national school and the Kindergarten. Note-taking in the lecture-room is no longer the chief part of university work. The focus of energy is rather the productive work done in the scientific departments, in the laboratories, the physical, pathologic, hygienic, and other institutes, where the students learn not by *hearing*, but by *doing*.

What a change has been wrought lately in medical study through adopting the system of instruction by observation,

experiment, and active participation! Fifty or sixty years ago, medical students began to be trained less in the lecture-room than at the dissecting-table or in the clinic. Instruction was, however, at first conveyed through the faculties of observation rather than by practical experimental work. Later on, the reform in the direction of active share in such work was carried out in a large number of institutions founded for the study of *practical* science.

In theology, philology, and law, the student's principal work is now done, not so much in the lecture-room as in the *Seminarien*, and in various societies which afford the student an opportunity of progressing in his science by *productive learning*. In mathematics, also, the most abstract of all the sciences, we have proof that it is possible to encourage, even in the university, similar productive work. A celebrated mathematician at the University of Leipsic had a modelling workshop which adjoined the lecture-room. He made his pupils model in plaster the curves and surfaces of the higher order which they had calculated, so that they might thoroughly understand them whenever drawing on the flat was not an efficient means of demonstration. (A well-known member of the medical faculty, a pathological anatomist, once said to me, that leaving purely verbal instruction out of the question, even the knowledge acquired by observation is not sufficient for the young medical student; he must, through the methodical dissection of natural objects, train his hand to the skilful use of the knife; and even when this is accomplished, the student should be able to reconstruct in his mind the organism he has destroyed. He must therefore be accurately acquainted with the various parts in their relative positions, and he cannot be sure of possessing this knowledge unless he can draw, or better-still, model them, though it be but roughly, in clay or wax.)

And for this purpose methodical Manual Training in modelling clay and in freehand drawing would be the best foundation.

The same holds good in the application of the principle to secondary and elementary schools. That which takes place in the high places of scientific instruction percolates down to the valleys below. Every step forward must gradually be recognised as a gain for the school. The latter will not long be able to avoid the application of the principle which requires the participation of the pupil in practical work. Nor are the signs wanting that such a change is coming about.

In geography the pupils are no longer required to learn dead names and figures; they are shown numbers of excellent models; and from intuitive instruction the teachers proceed to experimental. The pupils are taken on excursions, where they learn to recognise true geographical features, such as water-springs, water-sheds, brooks, valleys, mountain-summits, peaks, ridges, etc. They then reproduce what they have seen by drawing a map, or constructing a model in high relief. Thus the active work of the boy is employed in extending his knowledge.

In mathematics the teacher strives to put life into the material which has been handed down to us in dogmatic form, and endeavours especially to make the student himself solve the mathematical problems. It is evident, therefore, that in this branch of teaching also, an effort is being made to replace the passive reception of knowledge by the active participation of the student in the work, and to render the pupil's mathematical ideas in themselves productive.

Among the teachers of modern languages a new school has arisen, and is constantly gaining influence. It rejects the system of teaching modern languages by grammar only, and urges that language should be treated as a living thing. It teaches the learner to train his ear to catch the foreign sounds, and his vocal organs to reproduce them. This also is a training which requires the boy's own participation in the work. In physics, especially in many of the normal

schools, instruction by observation is followed by experimental training. The students not only watch the lecturer make experiments, but are themselves set to work to construct simple physical apparatus in the laboratory. This, it must be acknowledged, is a step forward in teaching. For an experiment neatly performed by skilful hands is most deceptive as to the difficulties connected with it. Not until he realises the inconvenience of the delays which arise from his own imperfect experiment does the learner gain experience, or become acquainted with the various properties of matter and with the laws of nature which are thus revealed to him. It is not actual practice as long as the lecturer alone experiments, while the student is merely a listener and not a doer. It may be urged that instruction based upon the active participation of the pupil in the work can progress but slowly. True, it is impossible to accumulate the same quantity of matter as under the old memory system. But the saying holds good, '*Weniger ist mehr.*' What is taught through actual experiment has a deeper foundation, for the skill thus acquired through experience is the property of the pupil for life. What he learns by rote, for examination purposes only, is a vain and transient possession.

Manual Training, however, is the department of instruction on which the idea of educating the child in and through its active participation in the process, has set its clearest impress. Manual Training proper is founded upon and exists for that idea alone. The efforts made to introduce Manual Training are nothing more or less than endeavours to stimulate the boy's self-activity in a sphere suited to his physical and mental powers. Thus only will it be possible to infuse new vigour into that system of intuitive instruction which its opponents revile for its sterility, and which, though nominally a system of nature-teaching, is to a large extent degraded into the mere memorising of bare words. When instruction in mathematics, physics,

geography, and natural science are based not only on observation, but on practical participation, when experimental science shall have fully merited its name in its attitude towards inquiring students, then, but not till then, shall Manual Training bear full fruit in connection with school education.

The logical principle from 'doing to knowing' will then find its true fulfilment, and knowledge of language, the principal study of to-day, will receive a due and living complement.

C. PEDAGOGIC REASONS.

Apart from the reasons given in the history of educational development, Manual Training is required upon purely pedagogic grounds. It promotes very considerably the purposes of *general education*. In the following remarks we will therefore try to show how manual training is able to assist in the attainment of the object at which general education aims:—

1. *Physical Training.*

Manual work, like gymnastics, develops the bodily strength, the agility and skill of the boy, and by a wholesome change renders him more fit to resist purely mental exertion. Manual Training has a direct influence upon the physical health of the pupils, inasmuch as it requires the body to perform all kinds of movements, and, unlike brain work, sets the muscles in action. And if the strain of school work at present is altogether too one-sided, practical occupation introduces a just proportion and harmony between mental and bodily exertion. This cannot but have a beneficial and direct influence upon the normal development of the rising generation.

As to the hygienic importance of Manual Training, I will speak briefly, for we hear much about it from distinguished and various authorities. I need but refer to the work of Medicinal-Rath Prof. Dr. Birch-Hirschfeld, 'On the Importance of Instruction in Manual Dexterity as regards Bodily Development and Preservation of Health.'¹ Birch-Hirschfeld shows in a manner truly classic, how practical work adds to gymnastics proper what we might call gymnastics for the nerves; as the former influence muscular development, so the latter relieve the brain irritated by overwork, and enable it to rest. Purely mental instruction exercises, according to him, the central portions of the brain, *i.e.* the most delicate organs of the mind; Manual Training exercises the organs of sense, bringing the eye, the muscles, the sense of feeling, into combined and sustained activity; physical gymnastics exert their influence through the vigorous incitation of muscular activity. But these 'nerve gymnastics,' relieving the tension on the brain, are in our 'nervous age' an invaluable means for the restoration of equilibrium between body and mind—an incomparable gain for the mental well-being.

By rights I ought now to deal with the much-discussed question of overwork. Whether we admit or deny the existence of the evil, it seems to me there is no doubt our schools of to-day neglect the physical development and the education of the senses in favour of mental culture. Possibly too much is not required in the school, certainly the work demanded from students is of too one-sided a kind. The powers of the young mind appear to have been strained to such a pitch that it would be hardly possible to increase the tension, and it would no doubt be wiser to retreat than to press on.

However that may be, we may well give heed to the cry now being raised, that our boys can no longer live their natural lives, that the brightness and fresh joyousness of youth is no more theirs, and that our system of public

¹ *Bericht, etc.*, 1888.

education operates through the accumulation of knowledge, the formation of the moral character being secondary to the acquirement of a mass of information.

It is a well-known maxim in pedagogy that before an instructive influence of any kind can be brought to bear upon the child, all its physical wants must be satisfied. We should not venture to test our modern school by this principle. It cannot, for instance, be imagined that a class, tired and exhausted after four hours of instruction, and about to submit to a fifth, follows the rule which demands for young lungs an abundance of fresh air, sufficient time for exercise, as well as variety of wholesome exertion. Physicians and lecturers on Hygiene must surely be believed, when they point out the injurious consequences upon the constitution of sedentary employment in close rooms; such a consequence, for instance, as the terrible increase of short-sightedness, which has been indisputably proved by statistics. Surely, for the sake of the vitality and energy of the rising generation, we may welcome a relaxation of our high requirements, if by so doing we can clear away some of this rank growth of over-instruction. One-sidedness in instruction would be prevented by the introduction of practical work. We all know from experience what a refreshment it is, after strenuous effort in any one direction, to be able to take up something else. It is not always absolute rest that is required, but a refreshing change. This is why in book-learning there is always variety and change of subject in the time-table. How much more beneficial would be a change between mental and bodily exertion, between passive reception of learning and free self-activity, between repose of the body and active movement of the same.

Practical work, like gymnastics, calms and restores the over-taxed mind, exercises the hitherto neglected senses, strengthens the nerves, and gives to the body the exercise it requires. Surely, then, practical work should take its place as a factor in general education.

2. Training of the Hand.

Practice in the skilful handling of ordinary tools in their various ways is the means by which Manual Training develops the general dexterity of the hand.

Any one who knows how awkward most pupils are and remain through want of practice, and who considers how increased civilisation makes life more and more luxurious, will see that the counteracting influence of Manual Training is greatly needed. So many little tasks are taken out of the pupils' hands. They no longer stitch or even cut the leaves of a book. The schoolboy of to-day does not put a cover on his copy-books, they are ready covered for him when he buys them; he does not rule his own lines, they are printed for him; he has a special little mechanical apparatus with which to sharpen his pencil; even his blotting-paper is sold ready cut and shaped.

One would almost think that boys now-a-days had no hands of their own. But if the object of the school be to educate man, to develop all the talents with which he is endowed, and not merely to cultivate artificially certain of these powers, allowing others to be stunted, surely with such an aim in view, the hand, as one of those talents, should not be neglected. 'The hand, together with reason, is,' says Buffon, 'that which makes man a man.' Surely, then, we may take it for a sign that we have left the straight road of education when an organ of the utmost importance is rigorously excluded from consideration.

The greater part of mankind lives by the hand; ninety per cent. at least of all school-going children will, in the future, have to earn their livelihood by their hands. If school is for man, and not man for school, it does surely seem strange that this objection of all others should have to be raised against the school, that it leaves this, the most important instrument of man, undeveloped.

When speaking of those who earn their living with their hands, we do not mean the country and town workmen and artisans only; industrial art, and the fine arts, architecture, plastic art and painting, music, are all dependent upon the training of the hand. How many a man's daily bread, happiness, life itself, is dependent upon the skilful hand of the surgeon in clinic or hospital! Are not the lives of the defenders of our country, and the country itself, dependent upon the quickness of eye, the firmness and steadiness of hand, of our soldiers? 'But,' say the opponents of Manual Training, 'the school does attend to the training of the hand in two departments of instruction—in writing and drawing.' My reply to this is: Both departments require but one and the same kind of employment or use of the hand. As regards skill of hand, it matters not whether the slate-pencil, the pen, or the lead-pencil be used. We may remark that in learning to write, the little child is forced into acquiring a means of expression of which it has no immediate need, and in which consequently it has no interest. Its liveliest interests lie in the exercise of its own faculties, and it is just because we do not reach it there, that we do not, in the true sense of the word, draw it forth or educate it. The fact is, the regulations of the school are in many instances prescribed by tradition, and are not always psychologically justifiable.

Even judging from this standpoint of instruction based upon tradition, one surely cannot admit that hitherto the hand has been trained in the school. The claims made upon manual dexterity, in writing and drawing, are surely most insignificant. The light tool, if indeed the pencil may be so termed, moves only along a plane. In using it, the arm and hand are continuously supported by the surface which is being written upon, no exertion of strength whatever is required. How different is the strength and skill required in the use of the knife, hammer, or saw. The tool is wielded in space; hand and arm are free, their task is no longer to

move along a surface that supports them. If the hand is to execute all the movements of which it is capable, and to obey every command of the will, it must dispense with the guiding surface, which is to it what a crutch is to the able-bodied.

I may here again mention the valuable scientific testimony I have already referred to, Professor Marshall's work, 'The Human Hand.' Any one who impartially examines his statements on historical development will find it hard to understand why so many educators of the people and so many teachers oppose every effort made to educate the hands of the rising generation.

Nor has the voice of authority failed to point out with unsparing fidelity the consequences which follow the neglect of Manual Training. I will only name one among the many authorities on this point. The testimony of Eitelberg, the eminent promoter of industrial art in Austria, is as follows: 'Now-a-days the workman or artisan, having attended the modern school, is in many ways educated and cultivated, but his technical education is altogether inadequate, and his productive power is accordingly exceedingly low. Which means in brief: our workmen know, relatively speaking, a great deal, but can do comparatively very little. They can talk—if need be—well, but they work badly, hence the universal complaint. Our artisans do not know their business properly, and consequently our handicrafts have deteriorated.' Now it seems to me, when so unimpeachable a witness as Eitelberg thus pronounces judgment on the consequences of neglect in training the hand, those whose calling it is to prepare the young generation for the life before them, will look for a remedy, especially when they remember that practice never achieves such results as it does in childhood, and that what is ~~then~~ neglected can never be compensated for later on.

The remedy is open: it lies not in the training of the hand for certain professions, but in a well-arranged course

of instruction in which manual work is strictly subservient to the purposes of education in its fullest sense.

3. Training of the Eye ; Cultivation of the Faculty of Observation.

Apart from those reasons given in the history of educational development, Manual Training must be insisted upon for purely pedagogic reasons, for it promotes very considerably the purposes of general education. We will therefore try to show in the following remarks, in what respect Manual Training is able to assist in attaining the object at which general education aims. Manual Training, especially when combined with instruction in drawing, exercises the capacity of the eye to see keenly and accurately. It cultivates the power of observation, teaches the child to see for itself, and affords it plenty of opportunity to gather its own experience.

We all know that pedagogics owe to Pestalozzi the improvement and progress achieved through his demand that instruction should be intuitive, that the child should see and observe for itself. Inestimable as was this boon, when compared with the mere knowledge of words and exercise of memory which preceded it, I must still maintain that practical pedagogy does not yet work it out to all its legitimate issues. The very basis of the system (its object lessons) is in constant danger of being betrayed into verbalism. Too often these object lessons are mere words about things, the things themselves being unknown to the pupils' own experience,—lectures, let us call them, about images, not about things,—veritable 'image worship.' Had the spirit of Pestalozzi's demand been realised, we should not have the vexation of seeing day by day how little the pupils use their senses, how in learning things by heart they forget to look and listen. It is astonishing how very little school-trained children observe.

I do not mean to say that, in my opinion, instruction by object lessons, even if it were used in a perfect form, would of itself be sufficient. We may distinguish four forms of imparting knowledge, viz. instruction by word, by the help of pictures, by means of the object itself, and finally, by causing the learner to occupy himself with it practically. It is evident why this last-named pedagogic method is of special value for the earlier years of childhood; let us therefore educate the children through work.

Manual Training without instruction by observation is impossible. Here the pupil proves by the work he does, if he has seen correctly; issuing, as it were, vouchers for each external impression he receives. The boy when using the saw, or working with hammer and pincers, cannot dispense with observation; he must use his senses the moment he commences to use a tool. Any one who tries the experiment will soon realise by personal experience that practical work demands all the attention—the least inattention and even a nail cannot be driven home.

We therefore lead from observation, as demanded by Pestalozzi, up to that which is inseparable from practical work, *i.e.* experiment. Manual Training is, so to speak, an improved course of object lessons, a system of instruction not by word but by deed. This principle will most certainly, I feel convinced, help to reform the school, and especially its teaching in those departments called experimental, as for instance, in experimental science. In time to come it will be difficult to explain how it was that the purely empirical knowledge of the higher schools was virtually acquired without the participation of the individual, and without any active experience on the part of the pupil. It will be equally difficult to explain how the antiquated dogmatic memorising system continued to prevail in these schools. The educational value of the great acquisition of the

last two centuries (the vast development of natural science) has not yet been completely realised. Manual Training will doubtless work reform in this instance also. In Manual Training we have, moreover, an admirable corrective against the natural tendency of language teaching (which deals chiefly with thought), a tendency which encourages the reflective rather than the observing faculties.

Of course, such instruction in language and reflection is essential, but it requires its complement of observation and personal experience. Practical work restores the mind after it has been cramped by grammatical instruction, and quickens the senses. The intelligent eye and receptive senses which the boy thus acquires, will prove beneficial in other branches of instruction: the whole nature of the boy will be changed. Hence, we learn that theoretical instruction is not hindered by practical occupation; for what is lost in 'time' is richly repaid in vigour and versatility of mind. As the wanderer who has rested by the cool fountain soon outstrips his fellow who has dragged himself wearily on; so the pupil who has had the pleasure and refreshment of practical employment surpasses his fellow-scholars. Their minds are glutted with mental food, and they feel the lessons a burden. It has been said that if practical work be admitted into schools, the latter will no longer be able to attain their high object. We would rather assert the contrary. Whoever would encourage and promote intellectual life, whoever is desirous of developing and deepening it, must begin by cultivating the senses. They are the mental scouts and purveyors; or, to use another metaphor, the portals through which experience enters. To allow the senses to deteriorate is to neglect the mind.

4. *Cultivation of Taste.*

Manual Training develops the sense of form and the appreciation of the beautiful. It lays also the foundation for the cultivation of taste.

No one can deny that an increase of the æsthetic element would be a real boon in our somewhat book-ridden system of education. Schiller's all-important letters on the æsthetic education of man place before us an ideal to which we have not yet attained. Enthusiasm for beauty of form, delight in colour, have scarcely yet found a home in our present system of instruction, unless it be in the drawing lessons, which even yet have a struggle for existence in the 'gymnasium.' The gymnasium, which might have learnt from Hellenism an enthusiasm for the world of beautiful shapes, is amongst us little more than a school of language. Show me the German boy who has so clear an idea of the Acropolis, of the statue of Jupiter, that he could draw it. Yet how is it possible to obtain a clear idea, a true picture of civilised life in Greece, without Hellenic art? Ought not the eye of the gymnasiast to be trained to enjoy the beauties of Grecian plastic art and architecture? But it is the taste not only of the gymnasiast, but also of every German child, which requires cultivation. Our industrial art is not only far behind that of other nations, but behind our own achievements in the past. Does not the blame of this, to a great extent, lie in the overwhelming predominance of literary education over artistic cultivation, and in the exaltation in education of *knowing* above *doing*? Learning so prevails as to cause the neglect of an artistic training, and knowledge is bought at the expense of skill, even during school education. The prejudices and defects of a nation may often be traced back to the nature of the education it received. We ought, therefore, heartily to welcome the opportunity afforded by Manual Training for the cultivation

of the æsthetic faculties, of the sense of form by wood-carving and modelling in clay, of the colour-sense in connection with cardboard-work.

5. Influence upon the Intellectual Life.

Manual Training assists mental culture. It quickens the intellect; for judgment and intelligence are required to solve the tasks it sets. It concentrates attention, and encourages logical thought. It enlarges knowledge, and develops the power of decision in practical matters.

It further assists the culture of the mind by clearing up points which theoretical teaching leaves vague and confused. This is especially the case when practical work is connected with school instruction, and the learner is compelled to reduce theory to practice. A boy's delight when the meaning of dim and half-grasped ideas flashes suddenly upon him as the result of his own observation and work, will reveal the degree of interest and intelligence which may be introduced into the schoolroom from the workshop. There are some matters which no amount of verbal teaching will ever make clear.

I remember a case of a pupil to whom solid geometry was a seven-sealed book. In the workroom the master took some wire, bent it so as to show the vertical and the plane angles, and the boy found the mysteries solved. He had seen nothing on the blackboard but a maze of lines. A pupil when making an octahedron sees, as he measures off the faces, that they are equal, and when he puts them together he finds that their surfaces are similar. Thus he learns the properties of solids not by hearsay, but through his own work and experience. That which he has wrought himself, becomes a part of himself. A pupil for whom the object is drawn only on the blackboard has not the same interest in it; as the drawing is wiped away with the sponge, so it vanishes from the tablets of his memory.

Briefly, then, set the pupil himself working, and there will be no lack of interest in what is learnt to deplore, and no weakness of memory on the part of the learner.

6. *Cultivation of the Will.*

Manual Training leads the impulse to activity into the right channel. It stimulates delight in work, and in what has been wrought, encourages a careful execution of the task set, and produces a love of diligence and other domestic virtues. Thus it trains the power of will to work for a definite aim, and serves to develop a strong and determined character. In requiring the boy to overcome physical difficulties, Manual Training calls forth his power of will, developing it by the gradual conquest of all the difficulties that present themselves, until his high-strung energy finds happy relaxation in the attainment of his end—a complete work.

In the guidance of the child's impulse to be *doing*, and in the education of the will, lies the highest office of manual training, and one which can be shared only by gymnastics. When concentrating his whole energy on some gymnastic exercise, the boy wills. But the concentration of will energy required by gymnastics is brief in duration, and produces but transient effects. The exertion of the will, on the other hand, demanded by Manual Training is much longer in duration. Here, one act of volition must follow another, and thus determination and unflagging tenacity of purpose are brought into play.

In taking up manual work, education enters upon a department hitherto but little cultivated. Under these circumstances we may hope to discover in the workshop many talents which in the school lie dormant and unsuspected. The present system of passive reception of the information proffered, does not admit of a comprehensive estimate of all a boy's abilities. Give him a chance of practical work, and a fuller revelation of his individuality follows.

Manual work exhibits the effects of will in a new field, and rectifies our judgments upon capacity and performance. The slow mind, which, despite its honest endeavour, is unable to satisfy the teacher in theoretical instruction, may do good, solid, practical work, by virtue of its intense conscientiousness and diligent perseverance. The scholar who used always to be at the bottom of the class, takes a delight in manual work, and gains confidence in himself; whereas, before, the feeling that he was fit for nothing prevented him from doing even what he actually might have done. The clever boy, to whom everything is easy, learns to recognise, when careless work fails, that there are things over which pains and trouble must be taken, and that conscientiousness and faithfulness are in any case priceless virtues. It is a teacher's highest delight to see a pupil striving with all his might towards the attainment of the aims which he, the master, has in view. The tenacious perseverance, determination, and zealous endeavour of which boys are capable, are surprising. These qualities are, indeed, not so conspicuous among lesson-harassed boys, of whom the passive reception of information is for ever being demanded. No wonder that the creative faculty succumbs before the ever-flowing stream of information. In the workshop all is different. Here are life and strife and ardent energy, in which every power is called forth. The foundation of the marked success which has followed the introduction by able teachers of manual work in boys' schools is based on the inborn love of work. Invariably this is the secret of success—the innate instinct of a boy for manual work. It is an instinct of which the school curriculum takes no count, but which blazes up enthusiastically whenever it is allowed free play. Though it cost honest sweat, it is the lever which sets all the muscles and nerves to work. As soon as one goal has been triumphantly reached, this inborn instinct hails another within sight.

The reason why all physical work is preferable to mental work is, that in it progress and success may be clearly seen. If any mistake be made in a piece of practical work, it turns out a failure, and the boy's own eyes tell him where the fault lies. If he has worked carefully, the success is a visible success, and his delight in the work achieved (work which 'brings the master fame') is his reward. Errors that creep into mental work are not always thus brought to light; they remain rooted in the soul. Nor can it be said that mental work is followed by success visible to the pupil, or such as he can appreciate. Will a boy who has translated a piece of German prose into Latin, say that he has advanced one step towards mastering the Latin tongue? He is glad the set task is done, and does not himself know what is right or wrong in his work. He waits for the master's verdict. But look at the boy whose creative energy is busy on a piece of practical work. What a delight, what an incentive it is to him, to see his work steadily progress! This work is his very own production. Moreover, each step towards the goal is in itself a goal. I might compare the stages of such manual work with the ascent of a mountain. First comes the determination to reach the summit which the eye can discern from the valley below. The plan is mapped out, and the route pictured in the mind; then the ascent is begun with courage and with hope. On goes the traveller bravely, every step bringing him nearer the goal. But there are halting-places on the road where one may rest a moment and enjoy what has been so far accomplished. Having reached the village whose church tower peers from the slope of the mountain into the valley below, we feel that a good part of the way has been covered. Then we make for the edge of the wood, with its promise of an open view. The horizon grows wider and wider, the scenery more and more beautiful, and at last the towering peak is right before us. The summit is reached. It was hard work, and accomplished with great exertion of strength, but

what we strove after, that we have attained. What do we care, as we cast our eyes over the hill and dale, or let them linger on the luxuriant orchards far below our feet, that the brisk walk and steep ascent have strengthened our muscles and our nerves, filled our lungs with ozone, and made our blood rush through its channels? And still, this all means improved health, while the heart is cheered, and the mind refreshed. Now, this is exactly what happens to the boy with his work. As soon as he knows what he is about to do, he plans out first of all the whole idea in his mind. He then proceeds to make a sketch of the little box according to the scale he has received, and cuts the various parts accordingly. After the saw has been called upon, and has done its duty, the plane is resorted to; the little planks are dressed. If upon close examination they are found to be correct, the putting together begins, and the boy follows the progress of his work with keenest interest. How sorry he is when the bell rings that calls him from his work! He makes up his mind to be there before the time to-morrow, in order that he may utilise every minute. Happy moment, when after hard work, and perhaps after many a trifling accident, the work stands before him completed, when that which was only a distant aim has become the tangible product of his will! The work, however insignificant it may appear, is more valuable to him than the most perfect work of art. The zeal and delight with which they work, make boys oblivious of how much they are learning, unconscious that the will is being schooled into firmness and determination. Whatever the master may have in view as his educational aim, the independent achievement which he sees in his own work is enough for the boy. Each fresh task accomplished spurs him to new and strenuous effort. The power of *doing* increases the love of creating, and thus energy is developed, an educational factor which ought to be turned to much account. Self-reliance, which springs from it, must ever be regarded as one of the highest edu-

cational gains. 'Trust in thyself!' Well may such a maxim spring from such creative work; and lessons thus won, as it were, from life, never perish, but become part of ourselves, to find fresh application in other phases of our being. Firmness of will can never be instilled by word, it can only be developed by action. If a boy learns through manual work that he has the power of compassing any special aim which he may have in view, he will actively exercise that power. This in itself forms his will.

Now let me boldly ask, Does any other kind of instruction—Latin, history, mathematics, or natural history—afford the teacher such ample opportunity of influencing the cultivation of his pupil's will as Manual Training undoubtedly does? Boys who have learned bravely to exert their whole strength in overcoming difficulties, who have been allowed and encouraged to keep up a constant interchange of bodily and mental effort, will never be in danger of suffering from that unnatural weariness of learning which is so disastrous. They will have acquired the power of willing. If idleness is 'the root of all evil,' then active work is 'the root of all virtue.' When it is clearly seen and understood that school is not merely a place in which to impart knowledge and cultivate the mind, but is really a place of education, from whence men are to go forth strong in will and fit for action, then will education based on *doing* be allowed free scope.

There is no lack in our nation of learned and reflecting minds; what we want are men of energy, men of action. This in itself is sufficient reason why Manual Training should be demanded and encouraged, because it assists in the cultivation of the will. The motto, 'Blessed be the ready deed!' ought also to be applied in education.

7. *Review of the Pedagogic Reasons for Manual Work.*

We demand, therefore, that school instruction shall be complemented by active employment. We do so because, as we have demonstrated, such a complement is necessary. There is a defect in the education of our boys, and unless we remedy that defect, our lads can never be considered as having an all-round education. We have shown that Manual Training is a misunderstood but nevertheless valuable means of education; it works in a direction hitherto neglected, and we want a place made for it, if not in the school time-table, at all events in the education of our boys. We justify our claim by the fact that the child's hand is not being sufficiently cultivated; that the education of to-day stultifies itself in seeking to work through instruction and the mere enunciation of knowledge; that it does not transmute *knowing* into *doing*; that though it fosters insight, it neglects the will; and that, while the intellect is pampered, the culture of a well-balanced and self-reliant nature is altogether neglected.

We further drew attention to the fact that the educational reform introduced by Pestalozzi, in the principle of observation, is not in any way complete; but that, on the contrary, the demands which he makes in the name of education can only justly be fulfilled in Manual Training, which training requires from the child constant observation and attention. In Manual Training we see the first real system of intuitive instruction. We lead the learner on from observation through practical work up to experiment, and we thus reach the principle of instruction which lies at the root of experimental philosophy, the principle to which mankind owes its highest achievements, and the principle by which alone we can hope to make the education of the rising generation bear good fruit.

The lively interest which the young exhibit in manual work is due solely to the fact that they are thereby afforded an opportunity of observing and learning by *experience*, of shaping and producing by the exercise of their own

powers. So that in Manual Training we deal not with a department of education, but with its all-pervading principle, the co-operation of the child's self-activity for the purpose of its own development. In Manual Training this principle is clearly shown, and its practical pedagogic application developed. Herein lies our justification in seeking to include Manual Training in the curriculum of general education. In order, however, to exhibit its special virtues, it must be developed methodically; there must be a *method* of Manual Training. Religious instruction opens the child's eyes to the world of our religious ideas, natural history affords it an insight into nature around it, and Manual Training teaches it the A B C of human work.

D. POLITICAL, ECONOMIC, AND SOCIAL REASONS FOR MANUAL TRAINING.

But there is an economic as well as a pedagogic side to the question. In 1873, at the Vienna Exhibition, Austrians and Germans realised for the first time that their trade had declined, and that an effort must be made if they wished to keep abreast of other nations. Technical schools were founded for various trades. But it was soon found that the students who came to these schools were most inadequately prepared for their vocations. They could neither see nor set to work aright. They could not draw, and were utterly unpractical. Councillor Eitelberg of Vienna, a celebrated authority on the industrial condition of Austria, pointed out that scholars should be properly prepared in the elementary before admission into the technical schools; till this was done, you might as well, he said, try to erect a Colossus on feet of clay, as seek to restore the industrial art of Austria. The teaching of manual dexterity in public elementary schools must be the broad foundation upon which the monument of trade shall be built. Austrian art

industry would never, he urged, again be able to compete in the market of the world until in general education the dead word was forced in some degree to give place to the living deed. In Germany we had a similar experience. Professor Reuleaux, Commissioner-General for Germany at the World's Exhibition at Philadelphia in 1876, pronounced the verdict 'cheap and bad' on the exhibits of German industry, and thus threw a glaring light upon the state of our industry. This failure of German industry showed us that our manual work no longer occupied the high position it had been wont to boast. Not only was the work cheap and bad, but the art industries showed want of taste, as Reuleaux most strikingly demonstrated. The source of the evil was sought, and was found to a great measure in the battle between machine and hand work, in which the latter must inevitably succumb; for it could not compete against the low prices of machine-made goods. Another cause was discovered in the sudden enfranchisement of trade and manufacture, which at a blow removed the barriers set by the guilds; and yet another in the reckless competition resulting from over-population—a competition which led to the sale of goods at prices which rendered all thoroughness of work impossible. The ignorance of the people was also to blame. Their one-sided school education prevented them from appraising the value of thoroughly good work, and their only thought and guide in purchasing was the price charged. The cheapest wares were always chosen, even if they were worthless imitations got up for sale. Finally, there was ground for bitterest complaints in the apprentice system. The better classes of society would not allow their sons to learn a trade, for manual labour was despised. The more learned professions, or those that were looked upon as such, were over-rated; officials, even clerks, looked askance at the honest workman, and manual workers were recruited from the lower classes of the people only. They even preferred to send their children to the factory, where they had not to serve

their time as apprentices, and where they at once earned money. The trade masters complained bitterly, but in vain, of awkwardness and lack of skill on the part of the apprentices sent them, who, as they said, brought two left hands with them into the workshop, and did not even know how to use their own eyes. There was a quantity of half-understood stuff in their heads, but it would puzzle them to find their way out of the slightest difficulty. The natural result of this was an incapable set of artisans. In such a state of affairs there is nothing for it but to start afresh. It is now clear to every thoughtful mind that the old class of petty artisans must give up the hopeless struggle against wholesale industry. The master employing hand labour cannot think of holding his own against the enormous productivity of machinery. Alas that it should be so! but so it is. Here the artisan must strike his colours, but he has a promising future in art industry. Wherever mechanical work is required, there the machine will carry the day. But man must ennoble and raise his work through art. He must make an individual art outside mechanical work; to be brief, he must carry his work to a sphere into which the machine cannot follow him. This, however, cannot be done without the help of education. Schools elementary or advanced must not be allowed to foster one-sided knowledge. They must cultivate the power of *doing*. Artisans must be educated so as to be capable of individual work. This cannot be done directly by the foundation of technical schools whilst the public elementary schools continue their one-sided education. This great reform must begin in the elementary schools. Here children must be taught to see and use their hands, their sense of form must be developed, and their hearts filled with the love of work. Then only will the work of technical schools be founded on a solid basis, and not prove a mere castle in the air.

A boy who has been properly trained in manual work does not merely carry with him into life the new, varied,

and useful qualification of manual dexterity. There has been awakened and developed in him a valuable disposition and inclination towards all kinds of domestic occupation, which later on may protect him against useless and enervating excess. This love for domestic work keeps the husband away from the public-house, and binds him to the family. Love for home and home life thus strengthened, together with that contentment which flourishes amid the fruits of diligence, must be regarded as an ideal and economic gain which cannot be highly enough prized.

Thus educational requirements and the demands of practical life meet half way, and we may well hope that the educational reform so often attempted will at last be fully realised. For now-a-days, owing to the movement of reform, competition prevents any country from lagging behind in its endeavours. The northern countries, Sweden, Norway, Finland, and Denmark, have joined the movement heart and soul; France, Belgium, Holland, Austro-Hungary, and Switzerland are zealously cultivating manual instruction. Quite recently, too, in England, manual instruction has been admitted into the Educational Code by special legislation. The practical people of North America have taken up this system of instruction, and are putting it to good use; the Japanese have recognised the importance of practical work as a means of education; and lastly, many of the newly-civilised communities of South America, Chili, the Argentine Republic, and Uruguay, have followed the lead of the older states.

Of vital importance to us is the manner in which our highly-cultured neighbours, the French, have taken up the system of Manual Training. By a law issued on 28th March 1882, they made it compulsory upon all public schools. In 1883, Jules Ferry, the then Minister of Education, in a speech which he made on a great public occasion, dwelt on the great public importance of the matter. The French, he said, are a great and working nation; 'they have gained many a victory in the peaceful fields of free European

competition. But to those who can look further ahead it is clear that as in other battlefields, so here, we must not rest on our laurels. We have around our gates, as well as across the ocean, dangerous competitors. Their produce, such of it as reaches us ; their reports which we receive ; above all, the competition which meets us abroad in foreign markets—all these give us warnings which we dare not undervalue. Yes, indeed ; on the industrial battlefields as well as on others, nations may fall and be ruined ; here also we may be taken by surprise, and through overweening confidence, self-admiration, idleness, or through the inactivity of public authorities, lose in a short time a hitherto undisputed pre-eminence. Let Manual Training protect our country against this terrible danger. There is no national interest of graver moment, and I may here say and repeat it, without fear of contradiction : It is time to restore the workshop, for its restoration means also the restoration of our country.'

It is evident M. Ferry did not here mean industrial education in technical schools, but referred to the general training of the hand and eye, as the further comment shows : 'The prominent characteristic of Manual Training is that it is not mere technical instruction for a definite trade or profession ; it is a training in manual dexterity without specialisation to any particular craft.'

The last Universal International Exhibition at Paris proved to what importance Manual Training has attained in France since its adoption there. A clear-sighted German observer was commissioned by the Berlin authorities, on the occasion of the Exhibition, to make a close study on the spot of the French school system. In his very detailed report he insists that he states but facts, and only quotes figures that have been verified. In his concluding remarks he sums up his experience of French education in manual work in the following manner :—

'As regards the physical and industrial training of the young, France is on the right road. A school fulfils but

half its task unless it combine the teaching of the elements of practical doing with those of theoretical knowledge. By so doing it does not injure the attainment of educational aims, nor does it thereby encourage materialism, as is often urged, but rather introduces a refreshing and revivifying element into instruction. It thus greatly assists mental development, and secures, above all, to manual work that respect so long denied to it. There is no doubt when Manual Training becomes firmly rooted in France, and the law regarding the same has come into full force, the influence upon the French industries will be a very effectual one, and one which will force the other nations to follow suit. I trust, therefore, that the German Association for Boys' Manual Training will not tire of enlightening public opinion, and of carrying the interest in the matter into ever-enlarging circles of society.'

The encouragement of Manual Training has therefore become almost a national question for Germany. The lead which France has taken as regards instruction specially in Manual Training, is an example which deserves attention, and one which it behoves us strenuously to follow, lest we should be altogether out of the running. If Manual Training taught nothing but the leading principles on which all work rests, even so it would exercise a beneficial influence on the choice of a vocation. The individuality of a pupil can only show itself clearly when he is personally active, and not when he passively imbibes a mass of heterogeneous external information. Only by *doing* does he learn to know his own powers. Manual Training, then, should have a great social importance if it influences a boy in his choice of a calling. The cause of a most serious social phenomenon may also be found in the one-sided mental education of children. The work to which eleven-twelfths of callings of all kinds belong, is disparaged. The child is accustomed to value mental work, and to despise manual work. Can we therefore wonder that there is now-a-days so little inclination to manual

labour, trade, and industry in the rising generation? The child has learned to use its hand for writing, and perhaps for the rudiments of drawing, but it has not been taught to make any actual thing with it, or to use it for productive work. The eye has, of course, looked at letters in the school, but it has not been so developed as to see properly, or to take in form and outline in nature.. Again and again the book alone is placed in the child's hand as a means of education, but the child is not taught to use that hand, and therefore considers its functions as greatly inferior to those of the brain. Owing to the one-sided cultivation of their intellectual powers, our boys learn to shun physical activity. The idea that manual work is only meant for meaner intelligences becomes but too widely spread. How much intelligence is thus lost to economic life through the false conceptions which our present system of education encourages! We neglect to foster a due appreciation of practical work. The tendency to disparage it has become rooted, and exercises a pernicious influence upon the choice of a vocation. There is a rush to head-work, whilst the demand is for hand-work. One-sided training perverts the interest of our boys in the various callings. Hence an unhealthy social condition, and a real social danger in the shape of an intellectual proletariat.

There will be no rebound to normal conditions until education prepares the young for the practical work of daily life. Who can hope to reap interest in productive work, when it is not sown, and when, however unintentionally, we instil in its stead actual contempt for labour? Manual Training arouses such interest, and this at once brings it to the fore when we desire to encourage our young people to pursue economic industries.

But the interests of society require not only the proper appreciation of labour, but that the different classes of society shall live together in peace, each esteeming and respecting the work of the other. Class-distinctions are,

however, becoming more and more sharply defined. What we want most urgently is the softening of these differences in the earliest days of childhood. Manual Training acquaints children with work, and teaches them to respect it. They learn to value the products of labour, and to realise the social value of those who work with their hands. 'He who has never done manual work,' says Robert Seidel, in his excellent *Essay on Manual Training*, 'will not be able to appreciate its products nor to understand the producers. The artificial or money value of things is but a bad measure whereby to mete the recompense of toil. The former depends upon the laws of our social economy of to-day, and not upon the trouble, diligence, and skill which the thing cost. The rich man little knows that things for which he pays one or two shillings have cost some other man a long day's work in the sweat of his brow, or perhaps in freezing cold and starvation. Yes, indeed, if every article could relate the story of its making, we should often shudder at the amount of human misery, and we should think and act more humanely. It is a great misfortune for a country that the classes chosen to be its leaders have seldom known what it is to work with their hands. If they did, social reform and the morals of the whole nation would advance. Our moral conduct is largely dependent upon our moral estimation of man and things.' Whoever has anything to do with social and educational work must at least acquire some knowledge of social economic matters. For how can he otherwise understand his fellow-citizen who is employed in this work, how can he create rules and laws for him, when the work of the latter is so completely strange to him? And how can he approach him with sympathy, when his own education has taught him to shun or to despise that work? Brain-workers who wish to appreciate justly the practical workman, must first of all become acquainted at least with the rudiments of his work, they must have tried their own hand at it. They will then be able—and this is the chief point—to judge a

piece of work, the diligence, rectitude, care, foresight, and conscientiousness bestowed upon it. Only by such means do we learn to understand our fellow-men and sympathise with one another. Manual Training prepares the mind for such appreciation, and consequently it is required in higher schools no less than in those of subordinate rank.

The systematic culture of the hand might possibly be one of the means for the restoration of social peace. On the common ground of Manual Training, rich and poor would meet on a friendly footing, and those whose different positions in life now induce hatred, contempt, and mutual antagonism, would be reconciled, and joined in harmonious union.

This again would benefit our country both by the increased power of the individual, and by the approachment of all classes to each other. If the rich man could be led to respect the work done by others in the workshop, it might even lead him by degrees, according to his natural inclination, to such occupation of his leisure hours as might make him love and appreciate the work of the less wealthy. We must not forget that in many cases the work done in factories has sunk to a very low level of mechanical labour. The monotonous attendance upon machines which turn out vast masses of material is not an occupation likely to inspire a love of work. But the work of the individual in the family circle is eminently conducive to a love of labour. As he carves with his knife, or works with planting-stick and spade in the garden, his originaive powers have free play, and develop productive work. Thus manual work which is free to take its own line is a welcome complement to mechanical labour in the use of the machine. It shows work not from its hard side, in which human will is subservient to the iron power of natural force, but it shows us the free activity of individual ability. Thus we may hope to find in manual work help in reconciling social customs and in softening social prejudices.

III.

OBJECTIONS RAISED TO MANUAL TRAINING.

Though it may reasonably be supposed that much of what has just been said will disarm many of the objections made to Manual Training, still it may be well to adduce those most frequently urged, and endeavour to meet them.

We will divide our opponents into two different armies: on one hand there are the teachers; on the other, the artisans. Though the number of our enemies has greatly diminished, and though many a Saul has become a Paul when he clearly saw what our object was, still many are not yet converted to our cause.

A. OBJECTIONS RAISED BY THE TEACHERS.

1. *An Overcrowded Time-Table.*

The superabundance of matter now taught in our schools, the overburdening of the pupils, of which so much complaint is made, and the many branches of instruction already taught, these are the main points and reasons, it is urged, which make it impossible to fit in yet another branch of learning.

But those who argue thus are not aware that we do not insist upon the introduction of Manual Training into schools as something obligatory. The position we hold is exactly the reverse of this: let it be optional whether Manual Training be adopted or not, *i.e.* where conditions and circumstances favour our cause, where there are teachers willing and able to take it up, where there are rooms in which to impart the instruction, and where the means are forthcoming for the necessary tools and instruments, there

we desire that educational manual instruction should be introduced and fostered. Let it therefore be clearly understood, we intend to storm no schools, for most of the promoters of our cause are in their service. Our object is to cultivate a method of education, which we consider highly valuable, outside their walls, and to see if this branch of education may not at some future time be found profitable to them.

As in nature, so it is with the growth of new social developments: they unfold gradually with sure but silent progress. How could we expect or hope suddenly to force a new educational discipline into such close corporations as our schools? Even if the promoters of Manual Training had the power, which they are far from possessing, to effect such forcible introduction, they would, out of love for their cause, avoid the hostility which always follows compulsion. They desire absolute freedom of development for the still new and tender branch of instruction which they are cultivating. They would therefore avoid the rigidity of the school, or of any other fixed model. The young plant needs light and air and the propitious warmth of the sunshine—not force nor outward pressure. We in no way invade the school bounds. We desire only that boys should not be deprived of their leisure hours, and that they shall be allowed opportunity for physical exercise, and for such free recreation as shall serve for the expansion of their individuality. We only want to restore to our schoolboys, especially to those in our higher schools, that precious boon of leisure time, a boon which is absolutely necessary to any one who would fully live out his own inner life. Thus, as we are far from desirous of forcing an entrance into the school, objections to Manual Training based on this argument fall to the ground.

2. *Loss of Dignity to the Teacher.*

It has been suggested, in scholastic circles, that the teacher would lose dignity if he were seen at work in the workshop, that his status would be lowered if, in 'the once sacred circle of intellectual life in the school, a new, powerful and material factor were introduced.' Something, too, has been said of 'the moral degradation' of the teacher which might follow on the use by him of tools.

The teacher often borrows the pencil of the artist, the pen of the writer, for his purpose. Is it then degrading to take the plane, the file, or the hammer from the hand of an honest artisan with the same pedagogic intent? Let us be open: a false and unjustifiable contempt of manual labour has infected our nation, and many of our teachers have caught this prejudice. But it seems to me that the highest dignity of those who educate the people should consist not in subservience to idle prejudice, but in the fulfilment of what is a plain duty—the providing of all that is required for the full development of the young entrusted to their care.

Is the ideal teacher a conceited dandy, who considers he must avoid intercourse with the common folk whom he educates, and who looks askance at the artisan? Is he not rather a Pestalozzi, eager and enthusiastic for the people, with their interests at heart, a father to the orphan, careless of dignity if he can but help the needy? The spirit of Pestalozzi has not yet, we are glad to say, died out among our German teachers, or else how could we account for the many voluntary teachers of manual work who gladly give up their free afternoons in order to spend them with a crowd of eager boys? It is satisfaction enough to them to feel that they are actively assisting to propagate a new branch of instruction.

The free intercourse in the workshop brings boys and teachers into closer relationship than the schoolroom allows. The educational influence is also a deeper one, exerted as it is in an atmosphere of freshness and joy. As in the playground the teacher shares the delight of his pupil, so in the workshop a more intimate intercourse springs up between them, and if it is to be our aim to train the pupil to see with the eyes of his teacher, how can the growth of such human sympathy possibly injure the dignity of the master? Further, Manual Training recognises none but willing pupils, and none but willing teachers. Those, therefore, who fear to lose their dignity by such work will not be exposed to any danger, for they will, of course, not offer their services.

3. Expense in connection with Manual Training.

The heavy expense involved in the introduction of Manual Training is another reason urged against it. It is significant that this complaint is made not by those who make and have made actual sacrifices on its behalf, but by those whose willingness would never be put to the test. Of course, the fitting-up of a boys' workshop does cost money, but what truly good cause does not demand some sacrifice? The cost, however, is in no way an insuperable obstacle, especially to those who appreciate the true educational value of Manual Training. Whence, I am asked, is all the money for school workshops to come? And I answer, From the same source which supplied 'gymnasiums' with all their furniture and apparatus, and which supplied also the necessary means for carrying out the scheme for the manual employment of girls. In the first place, however, the cost must be borne, as it has hitherto invariably been borne, at each new centre by the voluntary promoters of the idea. But it is my belief that, perhaps for tactical purposes, the

financial difficulties have often been much exaggerated. Face them, and they dwindle considerably. I have before me the exact details of the cost of a workshop fitted with all that is requisite, which has been at work for several years. According to them, the fitting-out of a workroom for carving costs about £7, 10s.; for cardboard-work, £6; for working in metal, £5; and for bench-work, £27, 10s. Surely such sums as these could be raised, and they represent workrooms well equipped. The bare necessities can be obtained for much less without any detriment to the results of the instruction. I know of workshops established by the energy of a single enthusiastic teacher. It is touching to see with what slender means, and under what untoward circumstances, many a German teacher has successfully established one of these workshops. 'Necessity is the mother of invention,' and the old saying, 'Where there's a will there's a way,' applies in our case. The furnishing of the bench-workshop is, comparatively speaking, the most expensive, and yet it is the one most in vogue in Sweden—a proof that the difficulties are surmountable. Moreover, owing to its northern situation and the nature of its soil, Sweden is a poorer country than Germany, and yet, though the introduction is optional, a workshop is attached to every elementary school, and what is more, it is generally, as I said before, one for bench-work.

Taking everything into consideration, it does not appear to me to be right to make this educational question a question of money. The most important consideration is the intrinsic value of Manual Training. If upon a close and earnest examination of the question the verdict be in favour of it, then we should not hesitate at the sacrifices which manual training demands; whereas, if it be found to be unprofitable, there will be no need to make even a trivial sacrifice on its behalf.

4. Manual Training and the Family.

It has also been asserted that the solution of the problem of training the young to do physical work belongs to the home alone. But considering how the school, and the tasks it sets, claims all the child's mind and thoughts more and more imperiously for itself, it is natural that the family and the home should gradually incline to the belief that all educational duties should likewise devolve upon the school. The shifting to and fro of the task from one to the other will not solve the problem, and so the school workshops have stepped into the breach. The most ideal form of instruction certainly would be for the father himself to employ his children in practical work at home. But where is opportunity afforded for such work, especially in a city? What father has time now-a-days, in the rush and bustle of every-day life, to occupy himself thus with his children? And when, after the toil of the day's business, he is able to enjoy a leisure moment, does he not prefer to spend it in his own recreation, rather than in instructing his children? And even supposing he were willing and had the time, has he the skill and the indispensable patience required for manual work? No, we do not wish to take those children from their homes who have in their fathers the best possible of teachers, but we wish to offer a good substitute to those who cannot enjoy such a privilege. In the boys' workshop they find material and tools suited to their strength, and a course of methodical instruction—important adjuncts to the success of their exertions. Their visible progress in the mastery of their tools provides ample stimulus and encouragement to further endeavour.

The objection has been raised against boys' workshops that they estrange the child from its home. We may say

in reply, It is true that family life should be encouraged and strengthened by all possible means. Influences injurious to it lie elsewhere than in Manual Training—in the craving for excitement, in the search after pleasure and the demand for distraction outside a home which too often has lost its charm. We maintain rather that Manual Training brings a blessing to family life. To a lad who has learnt to occupy himself with some practical work, home-life becomes daily more and more attractive. How he delights in adorning his home with the works of his own busy hands! Any one who wishes to see how boys' manual work serves and helps family life needs but to enter a boys' workshop towards Christmas-time, when work is being done for Christmas presents, and see how active the boys are, and how completely wrapped up in their work.

How, then, can there possibly be any cause for estrangement of the children from their home and parents, when the boys are learning how best to spend their leisure time in the family circle? All we desire is to plant anew the love of home employment. We seek to revive that which has perished, and are we to be prevented from so doing by the accusation that we are injuring family life?

5. Manual Skill an Individual Talent which cannot be taught.

Another objection more often urged maintains that manual skill is really an individual talent, so that a general instruction therein would not bear the hoped-for fruits. There is no doubt about it. Individual talent is as pronounced in practical as it is in mental work. But is this any reason against a general training of eye and hand? Exactly the same reason used to be urged against drawing: it was argued the pupil must have 'genius' for it. Yet anybody who has

seen a proper lesson given in drawing knows that every pupil is able to attain to a certain average degree of skill in it. If, therefore, the fact that there are some very clever and some very awkward pupils in this branch of instruction be sufficient reason to neglect the training of eye and hand, and the cultivation of the will in the manner we propose, we should then have to do away with school instruction altogether. For in school we find a few highly-talented pupils, and many untalented ones, and many who are of average powers. Instruction is meant for the latter. It is on this principle that we proceed; experience has shown that, if properly trained and guided, every boy with normal talent can learn to use his hands.

6. *Hygienic Objections.*

The hygienic objections against Manual Training have been confuted as often as they have been raised. We can meet the reproach that practical employment of the children necessitates uncongenial confinement in the house, with the one answer which will disarm that objection, viz. that gardening during the fine season has been added to the means of occupation hitherto employed. School gardening, which has been carried on so successfully in Sweden and Austria, has been adopted in Germany. But there are days when it rains; in winter it often snows. Surely there can be no objection to the boys being occupied at such times in well-aired, spacious workshops. On long summer days boys have plenty of time to run about in the open air, even though they devote a few hours weekly to the workshop. Working at the bench, sawing, filing, and hammering, are clearly well adapted to promote health. It cannot be denied that the whole movement for manual work for boys, on an educational basis, has its best justification in the fact that it develops the powers of the rising generation. The hygienic value of

practical work is proved by the statements of Professor Dr. Birch-Hirschfeld ('The Importance of Instruction in Manual Work for Physical Development and for the Preservation of Health,' *Bericht, etc.*, 1888), and in those of Geheimer Sanitätsrat Dr. Kristeller ('The Physiological and Psychological Side of Instruction in Manual Work for Boys,' *Bericht, etc.*, 1889), and by Dr. Vögtlin of Basle in his treatise, 'On the Influence of Boys' Manual Training upon the Health,' in the *Schweizersichen Blätter für Schulgesundheit*, V. 20), and finally by the numerous essays in Dr. Kotelmann's *Journal of School Hygiene*. These authorities prove irrefutably the great value of manual work to the boys' health. Least of all can the objection be urged that this practical employment of the young is in any way a new burden to them. It is exactly the other way. For a moment's reflection will teach us that to work the body, *i.e.* to exercise the muscles, cannot possibly mean an overtaxing of the brain and mind already overstrained. It will be found to be a complete relief to them. A proof of this is seen in the number of boys crowding to the workshops. If any overburdening were felt, surely Manual Training, which is entirely optional, would never gain ground.

From the hygienic objections raised against Manual Training, the promoters of the system may only learn that in all they do they must never lose sight of such sanitary precautions as the proper ventilation and lighting of the workshops, and a constant change in the positions of the body demanded by the work, etc.

7. Danger arising from the Use of Sharp Tools.

The objection that the handling of sharp tools is dangerous for boys has not been justified by experience in the workshops. If the objection were admitted, then gymnastics and games would also have to be prohibited, on the plea

that the danger of bodily injury is greater in such exercise than when the children are sitting still. On this ground we should be forced to give up teaching swimming, owing to the danger of drowning. It has been proved that far fewer accidents happen to good gymnasts than to awkward persons who do not know how to use their limbs properly, and who have not sufficient presence of mind to save themselves in emergency. Activity and courage are not learned or acquired through sitting still in a room, but rather by the energetic use of physical strength. Surely it is better to prevent a boy from hurting himself seriously by teaching him how to handle a knife properly, and by giving him suitable opportunity of practising what he has learned, than by forbidding him the use of any sharp instrument whatever, supposing even it were possible to carry out such a restriction permanently. If children are awkward in handling sharp tools, and are consequently endangered by them, surely there is no more natural means of protecting them than to convert their awkwardness into skilfulness by educational influence.

8. Review of the Objections raised by the Teachers.

Taking all in all, many of the objections made by teachers do not appear to have been gathered from experience. In fact, the question addressed to the protesting schoolmasters as to whether they have practically applied the method, or watched the pupils in the workshops, and whether they have based their verdict upon such experience, is generally answered with a negative, and with the statement that they object to Manual Training 'on principle.' But it is only fair to insist that he who sets himself up to be a judge in any matter should be thoroughly versed in what he is talking about, and not judge from hearsay.

Many of our opponents among teachers take up a false

attitude towards Manual Training, inasmuch as they think they are able to suppress the whole movement by opposition. Observation, however, teaches that an agitation for this method of instruction is on foot in all civilised countries, and that it is steadily growing. France and Russia, Norway and Sweden, Belgium, Holland, Switzerland, Austria, England, and North America, strongly support and promote the movement. Surely, then, it has become for us, to a great degree, a national question whether German pedagogy will turn its back completely upon a branch of education so full of life and vigour. The German Association for Boys' Manual Work, composed entirely of voluntary members representing various classes of society, will take care that this shall not happen. The question now is, not whether manual instruction is or is not to be, but whether this education is to be developed with or without the assistance of the schoolmaster. As education is concerned, teachers ought to be at the head of the movement, and to take the lead in the matter; and they ought to see to it that manual instruction is permanently placed on a purely educational foundation. The object is not to accomplish the task before us on stereotyped lines, but to call into life something that does not yet exist. This should be a welcome task to every independent-minded educationist.

B. OBJECTIONS RAISED BY ARTISANS.

1. Fear of Competition.

Lastly, we have to consider the objections raised by artisans. Some fear the competition of boys' manual work. Others look down upon the work done by boys' hands as useless waste of time and labour. It seems to me that both are wrong.

As regards the artisans' fear of competition, facts have already proved *that* fear to be groundless, and it is disappearing. Work done by a boy while learning or while exercising his developing strength can hardly compete in the market with the work done by an expert, who has at his command all the resources of a highly-developed art. An author might just as well fear competition from the first attempts of small boys in composition. Competition, in a certain sense, could only be feared if in the workshops work were done wholesale and according to certain fixed patterns. But there is no reason for anxiety; educational Manual Training excludes on principle all mechanical work. As soon as the pupil has mastered the technical difficulties of one class of work, others are placed before him. The moment routine begins, education ceases. So long as the pupil has difficulties to overcome in connection with any work, that work is not marketable. The moment it is marketable work he ceases to learn by it, and it is of necessity excluded from the number of his tasks.

2. Depreciation of Boys' Manual Work.

Other representatives of industry reject Manual Training as a useless trifling away of time and labour. They view the matter only in their own light, and will not listen to the idea of a preparation for industrial occupations in general. To them instruction in manual dexterity means nothing more nor less than a training for a trade begun before its time—so much time taken in advance from the years of apprenticeship. Whereas, in reality, the aim is simply to train the hand, to accustom the pupil to observe carefully, and thus to cultivate both skill and practical intelligence.

In judging boys' work, many artisans mete with the same measure that they apply to their own work, the result of a

highly-developed technique. They ought to judge of the former as the work of a child whose faculties are only just developing. How can they be expected to look at our humble achievements with the eye of a pedagogue, or to judge of them by the amount of labour they have cost? Of course, the boys' work must be done neatly and must be technically correct, but we must still take into consideration how much we can expect from children.

It must not surprise us that first-rate workmen, unacquainted with our aims, do not judge of our boys' work by the standard which is in reality the only one possible for such work. It is just as though an opera or concert singer were to judge school songs and their simple rendering from his own standpoint, or as though a great artist were expected to appreciate the simple work of the pupils in their drawing lessons.

The cardboard-work done in the school workshop cannot be looked upon as the work of a bookbinder, the bench-work done must not be compared with a joiner's work. We do not wish to, and cannot interfere with any trade by training boys for it. All we aim at is to lay a general foundation for practical work. In so doing we hope to train a rising generation well prepared for its work. Our object is not to save future bookbinders, joiners or locksmiths half or quarter of a year's apprenticeship. Masters should but ask themselves the question, 'Do they want utterly inexperienced apprentices, awkward in everything they handle and do, lads who are unable to find their way out of the least difficulty, who do not know how to set about a thing, and who are unwilling to work because they cannot do anything? Or would they prefer wide-awake lads, with practical minds and skilled hands, devoting themselves to their work with a heart and zest which must crown their efforts with success?

If they only treated the question thus, workmen would of

necessity become our best friends. But there are other reasons why they should be grateful for the system of Manual Training. The boys' attention is drawn to the difficulties of the work, and they learn to know the value of good, thorough work, and to distinguish it from cheap and inferior workmanship, thus securing to the artisan future customers who will always be willing to pay for finished workmanship. This was the spirit of Director Dr. Brinckmann's words, when, as leader of Hamburg art industry, he said, at the Hamburg Congress, of manual dexterity: 'Furnished with a practical sense of these things, the boy will, later on in life, occupy a very different and more intelligent position towards industrial products than is the case to-day. It is to the greatest possible interest of the industrial classes that the general culture of the great mass of people should thus be raised.' He then went on to say, after dwelling more minutely upon the educational gain of boys' manual work: 'These are advantages well worth consideration; it is well worth while to convince our industrial class of the fact that it must not oppose the movement in favour of Manual Training, but rather test its merits in a generous spirit, and assist it with wise counsel.'

The artisan has certainly nothing to fear from the general adoption of Manual Training; on the contrary, he may have much more than he knows to gain thereby.

IV.

HISTORY OF MANUAL TRAINING.

It would lead us far beyond our present limits were we here to attempt a detailed review of the history of the development of this branch of instruction. For such details we must refer the reader to the special works on the subject by Rissmann, *Geschichte des Arbeitsunterrichts in Deutschland*, Gotha, Thienemann, 1882; Meyer, *Die geschichtliche Entwicklung des Handfertigkeitsunterrichts*, Berlin, Theodor Hofmann, 1883; Wiessner, *Geschichte des Handfertigkeitsunterrichts für Knaben*, in Kehr's *Geschichte der Methodik des deutschen Volksschulunterrichts*, 2 Ed., vol. iv., Gotha, Thienemann, 1889; and to other works on the history of pedagogy. All we have to do is to sketch a clear outline of the genesis of our idea. We must first premise that the pedagogic Realism of the seventeenth century emphatically upheld against the then prevailing Humanism the idea that Manual Training is a means of education, an idea which Amos Comenius emphatically maintains. But this step did not procure its admission into the schools. At the end of the seventeenth century, through the influence of A. H. Francke of Halle, Pietism was constituted the heir to Comenius' theory, so that in the Francke Institute the first step was taken towards establishing Comenius' theory and applying it to practice. In the Orphanage as well as in the Pädagogium the practical work of the pupils occupied an important place; and thus Manual Training was introduced into many schools organised on the principle of the Francke Institute, as for instance, into the 'Realschule' founded by Hecker in Berlin in 1747.

Later, the *philanthropists*, under the influence of John

Locke, admitted manual work into their system of pedagogy. Basedow not only recommended it in his *Methodenbuch*, but introduced it into the *Philanthropinum* at Dessau. With still greater success, Salzmann in his *Ameisenbüchlein* upheld the idea, and in the academy at Schnepfenthal founded by him, Manual Training, as we now understand it, was largely carried on. Next, it would seem that Heinrich Gottlieb Heusinger, teacher of philosophy and pedagogics in the University of Jena, perhaps influenced by Rousseau, developed considerably the idea of Manual Training. In 1797 he wrote a pamphlet, 'How to use the Child's Desire for Activity,' in which he founds his theory of education upon this natural impulse. According to him, the province of 'intuitive knowledge' in a human being who is in a state of self-development can only be opened up by the individual's own working and effort. In his *Werthheim Family* (Gotha: Perthes, 1798-99), Heusinger gives excellent directions for the practical application of his ideas. His contemporary and fellow-worker in the reform of Manual Training was one Bernhard Heinrich Blasche, who was appointed teacher in Schnepfenthal in 1796. His principal work, entitled *The Children's Workshop* (4 parts, Gotha, 1800-1802), was a complete summary of such kinds of work as were at that time considered suitable for pedagogic purposes. Heusinger makes manual work the central point of his system. He seeks to base it on some principle which should find response in the human mind, hoping that it might co-ordinate itself with the personal experiences and observations of the pupil. Blasche, on the other hand, desired that it should form the very basis of intellectual culture, for which purpose he would have it an organic component of all instruction. The aim of Blasche was, as he says himself, to promote *intellectual* culture by means of mechanical employment. Guts-Muths appears as a fellow-worker with Blasche in his book, *Work and its Mechanical Principles*, which appeared in 1801.

While the pedagogues of those times emphasised the purely educational side of practical work, valuable efforts were being made in different parts of Germany, based chiefly upon social and economic grounds, which found realisation in the so-called industrial schools. A Bohemian clergyman, Ferdinand Kindermann, gave the first impetus to a movement which spread rapidly over Austria and Germany. In 1773 he had opened an industrial school in Kaplitz, near Budweis, and the Government of Maria Theresa soon afforded him the opportunity of extending his reform over the whole kingdom of Bohemia. In a few years there were over two hundred schools in Bohemia in which Manual Training was carried on.

Pastor Ludwig Gerhard Wagemann of Göttingen was the first in North Germany to introduce the so-called industrial training; numerous industrial schools soon arose in all parts of North and South Germany on the principle of his institution founded in 1784. They were all intended principally for children of the poorer classes, their object being to accustom the children to industry and activity, thus checking poverty by combating idleness. A secondary object soon appeared, viz. to enable the children attending these industrial schools to earn money by the work of their hands. This object gaining the upper hand in the 'schools of industry' naturally caused them to lose their importance as educational institutions for the young.

Industrial schools had from the very first great difficulties to contend with, the most important of which were the want of proper teachers, lack of necessary funds, and popular prejudice. No wonder, therefore, that the greater part of them perished in the disturbances of the war.

Like Kindermann in Bohemia and Wagemann in North Germany, Pestalozzi and Fellenberg worked for the education of the poor in Switzerland. The chief object of these last,

however, was not to train the children to become artisans. What they had in view was the child's education. But Pestalozzi was not sufficiently practical to carry out his own ideas successfully ; whereas Fellenberg found an able assistant in the management of his 'poor school' in the person of Wehrli, who showed great skill in cultivating the minds of his pupils during their working hours. Agriculture forms the basis of his educational system, combining as it does manual work and brain work. The Wehrli schools grew more and more to be looked upon as model institutions for the education of the poor ; so that eventually in the 'Asylums for Waifs,' and industrial schools which sprang up in Germany, France, Belgium, and England, the pursuit of agriculture came more and more into the foreground.

In Germany, when peace was restored, and after the famine year 1817, the system of industrial schools received a new impetus. The object was to improve the industrial power of the people, and the quickest way to compass this object and the education of the young was through work. Manual Training was not considered as a general means of education ; the idea was to arm the children of the poorer population with valuable aids for later life, so as to prevent them from falling victims to idleness and its consequences.

The promoters of the movement in favour of industrial schools at that period were not influenced by the ideas of Locke and Rousseau, Basedow and Salzmann, Heusinger and Blasche.

Heusinger's educational scheme was first revived by Friedrich Fröbel,¹ who put it into practice in his own peculiar way. Fröbel's conviction is that man's practical powers are not governed by his intellect, but rather *vice versâ*.

¹ As regards Fröbel's position towards Manual Training, see the Report of the Teachers' Training College for 1889, Robert Rissmann's Lecture, 'Pestalozzi's and Fröbel's Position towards Manual Training.'

The true education of man must start from *doing*: self-activity is, according to him, the foundation of all knowledge. Fröbel only succeeded in introducing his ideas into the Kindergarten, which is preparatory to the school. His successors, especially Frau von Marenholtz-Bülow, Bruno Hanschmann, Hermann Pöschke, Seidel, Schmidt, etc., made it their task to introduce his method into school education proper.

In 1850 a further impetus was given to the question of Manual Training. In that year Landammann Schindler of Zürich offered a prize for the best essay on 'How to free the Teaching at Public Schools from Abstract Methods, and to substitute a System which shall develop the Powers of the Mind and render them productive.' Besides calling forth a large number of general propositions for school reform, this prize question gave rise to the publication of two pamphlets on Manual Training, which once more brought its general educational importance into prominence. Both Dr. Konrad Michelsen (*The Industrial Schools of Country Communities*, Eutin, 1851) and Professor Karl Friedrich Biedermann (*Education to Work: Life's Claim upon the School*, Leipsic, 1852) spoke strongly against industrial schools as money-earning institutions. They hold that habituation to work should be the object of industrial schools. Although these pamphlets gave rise to a lively discussion in scholastic circles on the question of industrial schools, they did not produce any practical reform in the system of instruction.

From about 1855, Dr. Daniel Georgens, following up Fröbel's ideas, strove to solve the question of the practical employment of children. However far it may have been his object to improve upon Fröbel's method and develop it, and to extend Fröbel's ideas of pedagogy to a more advanced stage of school education, Dr. Georgens takes fundamentally the same view as Fröbel in regard to the principle involved. Like Fröbel, he wishes to convert the pupil from a passive listener into an active worker; he seeks to develop knowledge

through practical work. But in spite of the energy and zeal which he brought to bear upon the question, he failed in his effort to extend the system of Manual Training to schools. Georgens is characterised by the great importance he assigns to gardening, which he desires brought into organic connection with school instruction, and by his fertility in inventing games and occupations for the young. His *Bildewerkstatt* affords such an abundance of useful suggestions, that when once the idea of the practical occupation of the young has taken root, there will be no want of material with which to work, but there may be some difficulty in making a choice amid the abundance. Though Dr. Georgens' literary and practical pedagogic works are exceedingly numerous, he has not added to the fundamental ideas of Fröbel, nor exerted any far-reaching influence towards a realisation of those ideas.

Finally, we must not forget the standpoint of Herbart and his followers with regard to the idea of Manual Training.¹ Herbart himself attributes great importance to the human hand in connection with the culture of the mind, arguing that the hand holds the place of honour next to language, as making man superior to animals; and he requires every man to learn to use his hands. He demands that the hand shall be trained in the interest of education, inasmuch as the self-activity required is of lasting service in the study of nature. Technological observation of nature leads him on to technical occupations, which are closely connected with other forms of instruction. Finally, Herbart demands technical occupation in the interests of discipline (or the management of children) and in the formation of their characters.

Ziller, to whom we are indebted for a regular theory of Manual Training (in the acceptance of Herbartian pedagogics), considers manual work principally in its bearing

¹ For further particulars see the Report of the College for Training Teachers for the year 1890, Dr. Glöckner, 'The Position of Herbart and of his School to Manual Training.'

on practical life. In his opinion, technical occupation is an excellent means of connecting practical life with theoretical instruction. He claims, therefore, that besides the real object of education, *i.e.* the general culture of man, the school shall impart to each individual, for future use, a certain degree of the skill and dexterity essential for the purposes of practical life. In order, however, that principal and secondary objects may not be confounded, he recommends the introduction of *secondary classes* for the latter purpose. Whereas in the school proper all subjects are treated in the educational sense only, the secondary classes are preparatory, having regard to later interests in life, and influencing the choice of a career. Though purposely kept distinct, primary and secondary classes are in a way connected, the general education afforded by the former and the preparation for a trade in the latter being dependent one on the other. The two must go hand in hand. In the secondary classes general laws find their special application. The instruction here gained is a continuation of general instruction, and must draw thence guidance for future practice. On the other hand, general education will find many links in the practical work which will give the child opportunities of experiment; and Manual Training itself will often awaken the desire for a continuation of similar instruction.

The Herbart school thus distinguishes two elements in Manual Training. The first is the element of general education, which must include in its objects the development of manual dexterity. In all departments of scientific instruction, in mathematics, the history of civilisation, and geography, much practical work should be assigned to the school workshop. The second is the professional element which invests this Manual Training with a sort of social importance.

The special note of the Herbartian school is the stress it lays on the subordination of manual work to general education. In this respect it differs essentially from the school of Fröbel, who held that men are born to action and

not to speculation, and that, consequently, the knowledge which claims their attention is such as subserves action. With him action, or work, is the main and central interest which all departments of instruction must promote. Ziller, on the other hand, regards education as a training of the will, which belongs to the sphere of thought. He and other followers of Herbart place in the centre of their system those elements of education which contribute to the moral and religious formation of character. Work is subordinate. This view of the relation of manual work to other subjects causes the Herbartian teaching to differ widely from that which has taken root in most of the workshops of Germany and other countries. One of Herbart's leading principles is in direct contrast to that system of instruction which piles one object of instruction upon another, regardless of their interconnection. He sought to trace the many points of contact between human will and human power, and to show clearly their connection in educational work. This is why the Herbartians consider it futile to have Manual Training merely as an external appendage to the school, a mere interchange of head-work and hand-work without any internal relation between the two.

We trust that we have sketched with sufficient clearness the development of the idea of Manual Training in Germany, from its origin to the time when a fresh impetus from without caused the present agitation for Manual Training which has spread over all civilised countries. However various the opinions of former pedagogues (such as Comenius, Locke, Rousseau, Basedow, Salzmann, Heusinger, etc., Pestalozzi, Fröbel, and Herbart) may be on this question of education, and though it be difficult, even impossible, to reconcile all the views upheld, close examination will soon show us that they resolve themselves into two opinions only. These opinions are so directly opposed as to be incompatible, and all efforts for the practical employment of the young may therefore be divided into two great classes:

one consisting of those who encourage work for the education of the child; the other having *professional purposes* in view. We shall see that from the commencement of the present agitation this divergence of opinion has played a prominent part.

v.

DEVELOPMENT OF THE PRESENT AGITATION
FOR MANUAL TRAINING IN GERMANY.

The present agitation in favour of Manual Training originated in Austria with an essay by Dr. Erasmus Schwab, which appeared in 1873, entitled *Die Arbeitsschule als organischer Bestandteil der Volksschule* ('The Work School an Organic Part of the Public Elementary School'). The author claims that the school, if it seriously intends the preparation of its pupils for life, must include work as an educational element in its curriculum. The pupils' workshop is not to be a separate institution, but an essential part of the public elementary school. The same author issued almost simultaneously with the above essay another important one on the school-garden, according to Schwab a necessary complement to the school workshop. The Vienna Exhibition in 1873 helped considerably to promote Erasmus Schwab's ideas, three workshops fitted up according to his suggestions being exhibited in the Austrian model school: one work-school for girls; a school-garden and a workshop for boys.

During the same Exhibition, a Danish cavalry officer, Captain Clauson-Kaas, who had been appointed a member of the Jury for the department 'National Home Industry,' became known in Germany. At Vienna he entered into alliance with Erasmus Schwab. As a boy, Clauson-Kaas had been encouraged by his parents to fill up his leisure hours with all sorts of minor handicrafts. Through his

removal to an out-of-the-way garrison town, he was forced to teach his own children. A number of other boys joining in the lessons, he resolved to add various kinds of manual work to the subjects of instruction. In so doing he recognised Manual Training as a highly important means of education. After he had been pensioned, he settled in Copenhagen, and there began to agitate for the extension of this form of instruction. Clauson-Kaas especially emphasised the influence which initiation in manual work exerted upon the promotion of home industry. He became a zealous supporter of the attempt to draw the country-people during the long winter evenings of the North from idleness and the public-house, and to teach them the blessing of diligence by encouraging them to seek occupation in the circle of their families.

Since 1871, Clauson-Kaas has published the *Nordisk Husflids - Tidende* ('The Northern Journal of Home Industry'). Being appointed Secretary to the 'General Danish Society for Domestic Industry,' founded in 1873, which was to amalgamate all the efforts made by the Societies for Home Industry throughout the country, he edited a second monthly magazine, the *Husflids Mitdelelser* ('The Home Industry News'). The efforts made to promote diligence in the house naturally led to the encouragement of village industries, the object being to procure for the country-people, in places where the poverty of the soil made agricultural pursuits almost impossible, an additional means of earning a livelihood.

Principally through Clauson-Kaas, the efforts made in Denmark towards promoting home industry gradually became known in North Germany about the middle of the seventies. Under the impulse of a lecture of his on the subject, a 'Society to promote Industrial Work in the Home' was established in 1876 at Berlin. This Society twice sent a Berlin teacher, called Höhn, to attend a course of instruction at Copenhagen, and then founded a boys' work-school

upon the Copenhagen system, where fret saw-work, inlaying, wood-carving, carpentry, and brush-making were taught.

Through his lectures Clauson-Kaas became known in ever-widening circles in Germany. His most successful speech was delivered at a meeting of North-West German Societies for Education at Hamburg in 1879, the result being that Superintendent Raydt of Lingen was induced to address a petition to the Government of Hanover proposing the institution of a course of instruction to train teachers for manual work in the province of Hanover.

The impetus given by Clauson-Kaas spread further and further, until the idea of educating by means of manual work gained a footing in Leipzig. On 18th November 1879, A. Lammers of Bremen, at a meeting of the Leipzig Society for promoting Public Welfare, delivered a lecture on 'Self-Occupation and Home Industry.' The question of Manual Training was taken up on the spot, and the Committee of the Society directed some of the members to consider the practical realisation of the scheme. As a result, it was determined to found the Leipzig Boys' Workshop, of which the foundation-stone was laid, Easter 1880.

With a view to drawing attention to the matter in other quarters, I was commissioned by the said Society to write a paper, 'Practical Occupation as the Complement of School Instruction' (Leipzig, 1880), in which I collected the results of an examination of the *pedagogic* aspect of the question. In Leipzig we had from the very beginning looked upon the educational side of the question as the most important, ignoring the prospect of any pecuniary return. We avoided mechanically reproducing the efforts of the Danish home industry, our circumstances differing materially from those of Denmark. Trade might suffer from home production on a wholesale scale, and it appeared to us dangerous to allow industrial and pedagogic efforts to interfere with each other. Our main object was to educate a generation vigorous in mind and body, energetic, and strong-willed; and it may, I

think, be safely affirmed, as the history of the question shows, that the Leipsic Boys' Workshop has influenced and guided the method of Manual Training in Germany from the outset. True, we had to fight against prejudice and financial difficulties; but voluntary pupils flocked to us, eager to learn and to work. Side by side with the pupils' courses, there were courses for teachers, and to those teachers who showed themselves suited for the purpose, we entrusted the training of the pupils in the special department for which they themselves had prepared.

What Superintendent Raydt of Lingen had done for Hanover, that Stadtrat von Schenckendorff did for Görlitz. In a memorandum addressed to the Government Department at Oppeln, dated January 1880, he dwelt strongly upon the advantages of home industry for the distressed population of Upper Silesia, recommending the Danish organisation. The Government welcomed Von Schenckendorff's proposals, and commissioned Clauson-Kaas to go on a journey of inspection through the poverty-stricken districts of Silesia and to report his experiences.

A course of instruction, originated by Superintendent Raydt of Lingen for the training of teachers, was given at Emden in September and October, and was attended by sixty-three persons, the subjects being carpentry, fret saw-work, inlaying, cardboard-work and bookbinding, basket-making, brush-making, and plaiting in straw.

In 1880, Von Schenckendorff, together with the local authorities and corporate bodies of Görlitz, addressed a petition to the Prussian Government, requesting that a Committee be sent to Denmark and Sweden to inspect the local work-schools, and that the undertaking be encouraged in Prussia, provided the result of that Committee's inquiries was favourable. Government granted the petition, appointing a Committee of eight members to make a tour of inspection. As the result of their journey, it was found that no methodical and well-organised system of instruction in

manual work existed in Denmark. On the contrary, the few courses which did exist were but rarely conducted by educationists, and aimed merely at introducing home industries, such as straw-plaiting and basket-making, brush-making and working in wood, etc. It was also proved that Denmark was not, as had hitherto been thought in Germany, the source of all the Northern efforts on behalf of work-schools, but that in Sweden Slöjd had developed itself independently of Danish influence. E. von Schenkendorff summed up his verdict on the Northern work-schools as follows:—‘The objects which these institutions for training in manual work have in view are partly educational, partly social, partly economic. In Denmark the social mainly prevails; in Sweden, the educational. The Danish institutions are hardly anywhere connected with the school, although there is an effort in that direction; whereas almost throughout all Sweden Manual Training is connected with the school. So far as I was able to ascertain, a definite and exact system of teaching is nowhere to be found; but the Swedish institutions, especially those at Nääs, already show an approximation to such a system.’

The agitation in Germany for Manual Training had meantime been meeting with success. The question was, how to concentrate existing individual efforts in one common bond of union. This was effected by a Conference held at Berlin on 13th June 1881. It was initiated by Von Schenkendorff, and Professor Biedermann of Leipsic was in the chair. Hence the formation of the ‘German Central Committee for Instruction in Manual Dexterity and Home Industry,’ A. Lammers being appointed chairman, and the headquarters fixed at Bremen. On 3rd June 1882, this Central Committee summoned at Leipsic a Congress connected with an important exhibition of work executed in school workshops.¹

¹ Transactions of the Congress for Manual Training and Home Industry, held at Leipsic, 3rd June 1882. Gera, Issleib and Rietzschel, 1882.

Contributions came from Switzerland and Sweden, as well as from all parts of Germany. The many departments and branches of work represented afforded a highly instructive picture of the various efforts which had been made in the department of instruction in handicraft. The surprising abundance and variety of the work, moreover, proved clearly the strength and natural growth of the efforts made towards the reform of the educational system. The work done at the Leipsic Boys' Workshop assisted materially in showing the different views of the subject taken by experts in education. The exhibits were divided into two classes. In one they were arranged in four divisions according to the material used, paper, wood, metal, or clay. In the other, the work was divided according to the various branches of school-teaching illustrated, without regard to the material employed. The German *Blätter für erziehenden Unterricht* wrote as follows:—'In examining the work the spectator is at once struck with the striking progress which the Danish method has made in the hands of the Leipsic teachers. One sees at a glance that *nothing alien* to the school has here been introduced, but rather that the work is the direct outcome of the school; for every exhibit shows close relationship with the lives of the young and with the objects of school instruction.' This Leipsic Exhibition was, moreover, pre-eminently beneficial to the cause of Manual Training, for Herr Salomon of Nääs had contributed a collection of working models in Slöjd. Thus the public were for the first time able to make acquaintance with the Swedish method, which, as we have seen, had grown up independently of the Danish system. We learned then that Swedish Slöjd had been developed chiefly from the suggestions of Uno Cygnäus, the originator of the present system of elementary education in Finland; whilst Cygnäus in his turn had been inspired by the German pedagogues, Pestalozzi and Fröbel. So that the original source of the Northern system of Manual Training is German pedagogy.

To extend the movement, the Dresden and Leipsic Societies for promoting Public Welfare instituted conjointly in the summer of 1882 a course of manual work for teachers, under the direction of Clauson-Kaas. Sixty-three candidates applied for admission. This Dresden course differed from that given two years previously at Emden, chiefly in the fact that the great variety in the kinds of work had been somewhat reduced, through the exclusion especially of such as related to home and cottage industries.

On 7th October 1883, the German Central Committee once more met at Leipsic to discuss more particularly the directions in which Manual Training should be in future extended. My report showed that the training of teachers as instructors in manual work was the most effective means of promoting the cause. The importance of this method of extension had been recognised by the Committee of the Leipsic Boys' Workshop, which, ever since 1880, had been giving half-yearly courses, thus affording Leipsic teachers the opportunity of becoming acquainted with the system by practical experience. Courses of instruction for teachers from other places and from abroad had also been instituted at Leipsic during the summer holidays. The invitations sent out were favourably received, and in 1884, 1885, and 1886, the holiday courses were attended by educationalists from all parts of Germany and Austria. This success suggested the permanent establishment of such courses.

The German Central Committee, however, carried the propaganda still further. Congresses were held each year at a different place, when the various aspects of the great educational question were publicly considered. A Congress of this nature was held at Osnabrück in 1884, at Görlitz in 1885, at Stuttgart in 1886, at Magdeburg in 1887, at Munich in 1888, at Hamburg in 1889, at Strassburg in 1890, and at Frankfort in 1892.

The Stuttgart Congress of 1886 marked an important advance in the German movement. As the outcome of five

years' preliminary work on the part of the German Central Committee, the 'German Association for Boys' Manual Work' was established. The first resolution which the young Society passed had reference to the foundation of an institution in Leipsic for training teachers, which has substituted for the holiday courses systematic and continuous instruction. The new institution received great assistance at the outset from the fact that the Committee of the Leipsic School Workshop placed at its disposal their rooms and tools. The practical instruction of those attending the courses was, moreover, entrusted to professional men who had been for years tried servants of the cause. Each year saw the Teachers' College of the German Association for Boys' Manual Work developing and extending its beneficent influence. Instead of a four-weeks' course from the middle of July to the middle of August, there were two courses held in 1887, and two in 1888, in July and August; in 1889 an Easter course was added, and in 1890 an autumn course. What a far-reaching activity the Teachers' College developed, and what interest schoolmasters took in spreading the system of Manual Training in Germany, is proved in the most convincing way by the list of members published in the Annual Reports. These Reports, furnished with statistics, afford information as to all that is attempted and done in the institution. They also contain the lectures delivered within its walls, and are thus of lasting value for wider circles.

The rapid progress our movement has made is shown in the Report laid before the German Association for Boys' Manual Work, by Theodor Sonntag, a Leipsic teacher, on the condition and extent of Manual Training in Germany. Basing his statements upon information supplied by the various centres, he carefully traces the growth of the system up to the end of 1888. A proof of the outward spread of the cause and of its inner growth is afforded by the *Blätter für Knabenhandarbeit*, the organ of the German Association, which appears regularly every month, and which keeps up a

constant interchange of views among its members. An understanding of the educational, economic, and social ideas which lie at the bottom of the agitation is permeating a large portion of the community. Numerous towns, societies, and individuals have given their adherence to the German Association. There is a considerable increase in the number of places in which the system of instruction has been adopted, whether as an adjunct to the school, or in training colleges, or in orphanages, or in asylums for the blind and the deaf and dumb, or in industrial schools, and so forth.

Finally, the German Association has gained a firm footing through its recognition by the Royal Saxon Government, granted on petition. It was entered, on 2nd March 1891, in the Government Register at Leipsic as a duly incorporated Society. Hope may therefore be entertained that this German Association, thanks to the temperate and far-seeing management of its interests by the Committee, and especially through the wise and untiring efforts of its business manager, Herr von Schenckendorff, will maintain the position it has won, and achieve the objects it has in view.

Thus the ground has been secured upon which the present movement in favour of Manual Training may continue to thrive and grow. The direction it has taken is entirely different from that of the similar movement some forty or fifty years ago. It has led to the formation of a Society which has its members and representatives all over Germany. It seeks to perfect the system and the method of Manual Training. It everywhere follows the line of practical endeavour in connection with the school, leaving to the future the ultimate form which the idea is to take. Compared, moreover, with its commencement, the movement now shows decided signs of progress. Adopting at first Clauson-Kaas' ideas, it has gradually developed in a purely pedagogic direction. Working in concert, the promoters of the cause have found their views gradually become more uniform and more distinct. The chief object aimed at is no longer to

acquire a certain amount of skill, for manual work is now enlisted in the immediate and exclusive service of education. But the promoters of Manual Training have still a battle to fight. It will cost them many a hard struggle before all prejudice against the principle is removed. The workshops must justify their existence by the results achieved. Thousands of boys must first feel that charm, that delight in practical work, which seizes every one who devotes himself earnestly to it. Here at the bench our boys, satiated with mental food, must be refreshed and invigorated. Parents at home will perceive with astonishment the change wrought in their children, who now observe and take interest in things which they were wont to find dull, and to pass over as tedious. When once the rising generation, educated through work, becomes itself the pioneer of the good cause, the German Association will no longer need to canvass for members.

Amongst the promoters of the cause themselves many questions remain to be answered, and much work to be done. It is, for instance, still a moot point whether modelling in clay or plastilina is to be included in Manual Training, or whether it should be excluded. Another question of importance is whether, for the sake of technical accuracy, the work should be a separate and independent branch of instruction, or whether, for educational purposes (as an aid, that is, to the development of intellectual life), it should be united as closely as possible with theoretical instruction, and thus incline towards so-called 'applied teaching.' A large field is opened out with the proposed plan of giving boys of the transition classes Manual Training suitable to their age. It is asked, Shall we make a bridge between the Kindergarten and the workshops arranged for older boys, in order that practical work may become a means of education not only for the boys at special stages, but for the whole of the rising generation? Finally, there are other important problems waiting solution. Is educational Manual Training to be adapted to the circumstances of country life?

Shall school gardening receive in our system the consideration which for pedagogic reasons it deserves? Important questions these, as yet undecided, the satisfactory solution of which it must be reserved for some future writer to report.

VI.

THE PRACTICAL ESTABLISHMENT OF THE
IDEA OF TRAINING FOR WORK.

Our explanations so far show plainly that German Manual Training is purely educational. Its object is not to train for professional purposes, and it excludes all mechanical manual work, such as straw and cane plaiting, brush-making, basket-making, etc., which, as the favourite occupations of the blind, are scarcely the most fitted to train the eyes of the seeing. A further reason for the exclusion of purely mechanical work is, that such work does not rouse and sharpen the faculties, but rather tends to blunt them. Our training also makes a point of excluding all work done for pecuniary profit, and lastly, all such as aims at direct preparation for some special craft.

It deals with the training of hand and eye only in order to make the education of the child perfectly harmonious. In subduing the physical difficulties which the great natural zeal of the child helps to remove, we also possess an irreplaceable means for training the will. Thus, Manual Training aims only at exercising and developing the faculties of the child. Hence we have, of course, to consider in the first place, not the products of the work, but the work itself, and what the child learns thereby through observation and experience and also through the schooling of the practical sense. Educational Manual Training for boys, therefore, does not seek the products of home industries. Home industries would soon lead to mechanical reproduction on a wholesale

scale. The thought of earning money suggests the introduction of division of labour and the use of machines,—a principle directly opposed to that of the education of the individual,—and we should eventually find ourselves face to face with the difficult question of the sale of the goods so freely produced. Should every-day life, immediate surroundings, and local circumstances cause the springing up of a home industry, it ought to be supported by the Administration or by Associations for Public Welfare. It has no direct connection with the education of the young through work.

And to Northern cottage industries, though their produce is not sold, the same remarks apply. Cottage industry is for grown-up people ; its object is not the acquisition of money, but the profitable employment of leisure hours. Those national economic endeavours which aim, as already said, at occupation for the country population in the winter evenings, and at keeping them from the public-house, are certainly highly worthy of notice ; and it would be a blessing could we in our country fight thus against gambling and drink, and by means of pleasant and practical work in the home make the domestic fireside and family life dear to the people. But we must keep in view the circumstances under which the Danish industries have grown up, as compared with the social relations of our German population. Cottage industries, it must be remembered, can only develop in correspondence with the individual inclination of the population in a certain district. What seems fit for Denmark with its limited and homogeneous communities, is not suitable for Germany without some alteration. Unconquerable difficulties have therefore been met with, wherever mechanical imitation of cottage industry has been attempted. The promoters of Manual Training in Germany consider, that the most efficient means for the propagation of cottage industry lies in the education of our young. It is much harder to win the frequenter of taverns back to his fireside than to train a boy through the pleasure which work gives to diligence, economy,

and order. If opportunity is afforded the young for that activity which they love to exercise, delight in domesticity will come as a natural fruit. A lad who has learned to fill up his time usefully, who from his earliest childhood has found his recreation not in indolence, but in refreshing change of activity, will not be enticed by idleness, which is the parent of vice. The best attempt to further the cultivation in all ranks of such industry (morally so exceedingly valuable) is therefore the training of the young to work. As the future belongs to him who has youth, we shall, if earnest attention be now given to the training of our boys, reap the fruit hereafter in a wide extension of domestic industry.

A. THE PUPILS FOR MANUAL TRAINING.

If we turn to the questions which arise as to the practical realisation of our ideas, it would seem comparatively easy to say what pupils are best to be trained. And yet this simple question has already been answered in various ways.

1. *Manual Work for Girls and Practical Occupation for Boys.*

In the present movement we are concerned only with Manual Training for boys. For, indisputable as it may be that in education and instruction preference is given in many respects to the male sex, yet in one point girls have a real advantage, viz. in the universal cultivation of their manual dexterity. Nor has such training been introduced that they may earn money as seamstresses or by embroidery: it is part of their general education. Moreover, every-day life itself renders girls more careful, apt, and skilful. It is natural for the daughter to assist the mother in the house, to sew, knit, darn, crochet, and so forth. It is different with regard to boys. One of the inconsistencies of our

present system is the fact that it is thought necessary to train the eye and hand, to cultivate the practical faculties of the girl at school, while those of the boy are neglected, an inconsistency which will be quite incomprehensible to a future age, the continuance of which can only be explained by the force of habit. Here is unmistakably a defect in the education of boys. As long as they bring two well-shaped hands with them into the world, capable of being trained, so long will the demand for a general and harmonious education of the faculties include manual skilfulness among its requirements. Should any one object that the necessity of thorough intellectual education leaves no time for this, he only concedes the one-sidedness from which the hitherto prevailing educational system has suffered.

2. *Work for Younger Boys.*

Further differences of opinion arise in determining the age at which the boy is to begin such work. In Sweden, the classic land of Manual Training, it is usually considered that a boy is not physically fit for practical work till he is twelve years old. This may easily be accounted for. In Sweden the first craft practised was working in wood, the material which a peasant can most easily procure for himself. The handling of the necessary tools, such as the axe and saw, the plane and gimlet, requires physical strength, and therefore the boys who work at Swedish Slöjd must not be under twelve years old. This is a fact arising from outward circumstances, but from these alone the general rules of Manual Training should not be derived. They rest on a psychological foundation. When a child is young it must learn to find its way about the external world of sense impressions. It must contemplate, observe, and gather experience. The perceptions acquired by sight must be controlled and perfected by touch. Education, therefore, must supply the child with plenty of concrete material. Are we to wait till

the twelfth year? By no means. The younger the child is, the more it is in need of such concrete material from which to form ideas. In the progress of his physical development the boy learns to abstract, he grows more inclined and more able to master with his intellect the matter conveyed to him by his senses. Fröbel was plainly right in devising tasks for very young children. Are the tools necessary for good work too heavy for handling? Is the material too stubborn for the child's physical strength? If so, let us seek for other material, and we shall find it easily enough in paper, cardboard, or clay. If others proceed on the method of finding the material first, and then boys of a suitable age to work with it, we must take the pedagogic method, and suit the teaching and the material to the age. Even in North Europe an endeavour is being made to supplement the Wood-slöjd for elder boys, and make it available for the education of younger children.

Pedagogic developments do not always take place in a logical order, but are dependent upon external circumstances. The agitation for Manual Training in Germany has not proceeded from the Kindergarten, which would have insisted upon a continuation of practical work in the first years of school instruction. It received its first impulse from Sweden and Denmark. It is therefore intelligible that our first thought was for lads from eleven or twelve to fourteen years of age. Now, however, the gap between the Kindergarten and the school workshop has been felt, and is supplemented by the so-called *preparatory* or *transition grade*. Other reasons have also been urged for the manual training of younger children. It is strange that neither gymnastics nor drawing have found a place among the lessons of the first school years. No care has been taken for physical development, nor for that training of eye and hand which is so closely connected with the perception and reproduction of even the simplest forms. The school has quite neglected this province. But the child must learn to read and write,

i.e. it is forced to acquire a means of intellectual intercourse in which it takes no active interest, for it possesses the living language, which is, for the moment, sufficient for its wants. Even drawing, which gives the elements of form, ought to precede writing, which is but the copying of conventional forms. That it does not, is one of the anomalies of our pedagogic system, which can be explained historically, but cannot be justified by logic. As gymnastics and drawing are entirely missing in elementary instruction, practical occupation should step in, as it were, in compensation. And here it would be advisable, nay, almost necessary, to let *practical* work go hand in hand with another branch of school instruction, *i.e.* intuitive instruction. The present intuitive instruction by means of pictures is, more or less, merely language-teaching, and very apt to lead to verbalism. Hence there is all the more reason why we should insist on practical work for the child, who would, through such activity, acquire from its immediate surroundings ample material for linguistic exercise. Moreover, the practical occupation of younger boys is much less difficult to provide for than that of older ones. For here we require the cheapest materials and the simplest tools. We need no special workshop, but can easily make one of every classroom. No very high technical qualifications are demanded of the teacher, and it is easy for him to carry on manual work by classes, whereas manual instruction for older boys demands more individual teaching; the teacher must divide the class into sections (say, from twelve to fifteen pupils). There is also more time and scope for such pedagogic development in the elementary than in the upper classes, where the number of subjects already taught is often an obstacle to the introduction of new ones.

The outcome of all these considerations is, that junior boys, according to their psychological development, must not be excluded from suitable Manual Training. Such training educates the senses, and at the same time leads the child to acute intuitive reasoning. Thus, practical work is of primary

importance in the education of young boys, while it supplements theoretical education for older ones. It affords a refreshing change of employment, and is desirable on the score of physical development and health.

For several years, indeed, junior boys have been admitted to practical work in some of the school workshops, specially in Saxony, at Dresden, Leipsic, Zwickau, etc. It is true that the work done by them does not amount to much. But if we only know how to take the standpoint of the little ones—if we can, that is to say, adapt our demands to their capacity—we shall see that they take even more pleasure in their work, and experience even more benefit thereby, than the older boys. The highly satisfactory results so far obtained in the preparatory grade, induced our Boys' Manual Training Association, at its general meeting at Eisenach, May the 23rd and 24th, 1891, to discuss the question of Manual Training for younger boys. The assembly declared that in its opinion a close connection should be established between the tasks of the Kindergarten and those of the school workshop, thus extending Manual Training to the beginning of a boy's school life. It accordingly recommended all German school workshops to make practical experiments in this department. The German Association for Boys' Manual Training has thus taken up the same ground which had already been trodden successfully by other school workshops.

Directly upon the work of the preparatory grade follows that of the school workshops for older boys. Practical experiments during the last ten years at many different centres, and careful consideration of their bearings, have gradually led to clearness and unanimity of opinion on this subject. It is very hard, however, to decide from these experiments the precise age when Manual Training is to cease. For boys who attend public elementary schools it must be naturally fixed by the end of their school career, and by their entrance into work-a-day life. For the pupils

in higher-class schools the limit is the same, or is fixed by the time when they no longer need guidance, and are able to make their own way in the careers they have chosen.

B. INSTRUCTORS.

Who is to teach? The answer is by no means unanimous. At present, however, most manual schools decide in favour of the schoolmaster, as a man trained and appointed to conduct the education of the rising generation. If manual instruction is a part of education, it must be entrusted unconditionally to the hands of the educationist. Such an arrangement has a definite advantage. The preconceived opinion that we wish to train boys to be artisans will only be silenced when the teachers themselves take an interest in Manual Training. We need, indeed, first-rate craftsmen to instruct our teachers, but we do not want them for our boys. The teacher must learn to do exact and technically accurate work, but for the child technical skill is a means only, and not an end. Against the employment of professional craftsmen as masters in schools, the objection must be raised that they will always be inclined to treat the pupils as apprentices. There are, of course, brilliant exceptions—men who bring to their profession natural pedagogic genius. These, however, are not common, and it is justly held that the workshop is the province of the craftsman, the school that of the teacher. The educational province of which we speak is, it is true, a borderland, and so debatable ground. Either the artisan must become a pedagogue, or the pedagogue must overcome the difficulties of technical detail. The latter is the simpler method, for it has been proved, and is being proved afresh every year in hundreds of instances, that the needful skill can easily be obtained. Even the well-qualified artisan often fails to bring out the points upon which the methodical progress of his work

depends. This is undoubtedly one source of weakness in the apprentice system. Severity and injustice in master and journeyman too often spring from their own lack of talent for teaching, a fact which explains the origin of our artisans' proverb, 'The apprentice must learn to steal with his eyes.' Of course the teacher in such circumstances has no great tax upon his energies.

Unhappily, the history of Manual Training in the past confirms our opinion. Any one who is acquainted with this history knows that once before a great effort was made in Germany to win the school for Manual Training. But this beginning did not thrive, just because the duties of school-teacher and manual instructor were divided. The school wants only such teachers as realise their share in the plan of general education. The schoolmasters of that day held aloof from Manual Training. It was introduced by persons utterly unacquainted with its educational motive, and thus it became pure routine. It lost its value, and fell into neglect. If we wish to profit from past history, and to bring the present movement to a successful issue, we must urge that Manual Training should be imbued with an educational spirit, and be brought into as close an alliance as possible with the school. I should only yield to a contrary opinion on one condition—that is, if it were proved to me that schoolmasters were unable to acquire the technical skill necessary for Manual Training. This, however, would be hard to prove, especially as a large number of instances show that it is perfectly possible to acquire a due standard of attainment. The teacher must, of course, be intimately acquainted with the technical detail of the branch in which he intends to give instruction. His skill must surpass the highest standard of excellence demanded of his pupils at the end of the course. He must further know the lines which the present development of the German Manual Training has followed. Finally, he must be quite clear about the course he wishes to take with his pupils,

and the manner in which he thinks to gain his end. Many schoolmasters achieve all this. If the teacher has been well prepared by experts, and has himself found pleasure in practical work, he will work on conscientiously for his own improvement. He will not look upon it as compulsory, but as a pleasure, and the change from mental to bodily exertion will be beneficial to him. Above all, we maintain that Manual Training cannot possibly be considered a new burden for teachers. It must be taught only by those who have prepared themselves for it voluntarily. Those who engage the teachers must bear the financial consequences of the undertaking. I know from experience that many teachers prefer giving a few extra lessons in the workshop to giving lessons in the Fortbildungsschule. The free intercourse with the eager boys in the workshop, and the unconstrained method of teaching, is in itself a restorative.

It ought, moreover, to follow from analogy with other departments of instruction that artisans should not be entrusted with Manual Training. We do not want acrobats for teachers of gymnastics, skilled though they be in the practice of their art. We require teachers trained to educate. Nor do we entrust drawing lessons, as formerly, to artists, who may well understand the technical detail of their work and yet not be able to teach it. Needlework instructresses in schools are generally certificated mistresses, and not, as formerly, professional seamstresses. Shall we then consider men who are conversant merely with the manual routine of a trade, but who have not received any pedagogic training, as fit to undertake the manual education of boys? It is impossible to accept such a proposition. It is absolutely necessary, we repeat, that the teacher should prepare himself for Manual Training under the tuition of able craftsmen, but it is just as necessary that the training of the young for practical work should be placed in the hands of pedagogues, who can keep the aims of general education in view.

C. PRACTICAL OCCUPATION OF BOYS—NATURE OF TASKS.

One of the most important questions is, What tasks shall be set? Some authorities exclude all articles of utility. They only wish to develop the child's physical strength by formal exercises. Others wish to gratify the enthusiasm of the boy by choosing the object to be made from his own sphere of interest. But even here there are different opinions. Some require the objects reproduced to be taken from the child's toys, others want the finished task to serve for home, and others again, for school use. But in one respect all who hold these various opinions are agreed, that the child should bring its own faculties into play.

1. *Exercises only.*

Strassburg is the place in Germany where it is almost a principle of manual labour to produce no useful objects,

and where the handling of tools is taught, as it were, on patterns. Here the object pursued is to teach the boy technical accuracy in work. Boys between twelve and fourteen are taught during

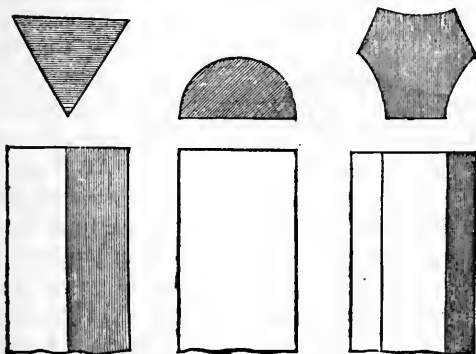


Fig. 1. Exercises from the Strassburg Designs.
Sawing and Planing.

the two years' instruction somewhat on the same plan as in the drawing-school. Their work has for them no other

manifest purpose than practice in the use of tools. In order to afford a clear idea of this course of instruction, some samples of the Strassburg models in carpentry are here given—exercises in planing and sawing, in the use of the mortise chisel, and in dowelling, Figs. 1-4.

The exercises for turning and wood-carving, as well as for metal-work, are similar.

In restricting the learners to exercises, the Strassburg system agrees with the method adopted in France, as may be seen from French designs and periodicals.

There evidently exists a deep-rooted difference between this conception of Manual Training and that which admits

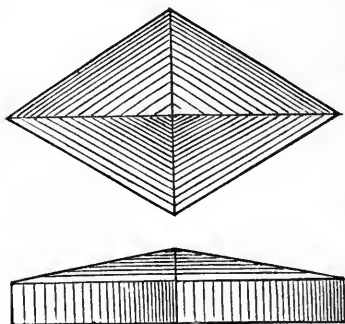


Fig. 2. Sawing and Planing.

of no kind of abstract exercise, but teaches technical dexterity only by the production of real objects. This contrast is most plainly seen by comparing Swedish and French Manual Training; in Germany the same opposition exists between Strassburg and most of the other manual schools. At Strassburg we were assured that the boys had

no desire to produce objects of utility so long as they saw that they were learning something properly, and that they were quite happy when allowed to go on to a new exercise. Of course that may be the case. Yet the question remains, If a free choice were given him, what would a Strassburg boy do? Carve a square tablet and then plane it smooth again, that it may serve for a new exercise? Or apply the exercise to the production of a neat little box, which he might, to his delight, take home to his parents when complete? If we wish to estimate the Strassburg Manual

Training rightly, we must take into consideration all the conditions under which it develops its efficiency. They are mainly these: Manual Training is imparted gratuitously, the Communal administration paying all expenses. Owing to the fact that all places in the school workshops are free, there is a great demand for them. The parents value the instruction their sons receive at the age of twelve to fourteen in the school workshops, as a welcome means towards securing the future well-being of the lads; for the boy who has been trained at school in technical work, having learned to plane and file, is the more likely to get an apprenticeship at a locksmith's or a joiner's. Such being the case, the Strassburg school can not only select the most suitable pupils, but enforce stringent regulations confining its pupils to uninteresting exercises. But what reason can there be for conditions so at variance with the nature of the child? They are simply concessions to the prejudice of the artisans, who fear the competition of boys' work. The history of Manual Training has plainly proved the perfect emptiness of such fears, even if we disregard the obvious fact that nobody can demand a monopoly for the making of necessary articles,

and that every one must be allowed to satisfy his wants in the way that seems to him the cheapest and best. It is evident that those who only desire to bring up the growing generation to work have a right to choose the means fittest for their purpose, and that they should pay a higher regard to the education of the young than to a foolish prejudice. Now, one of the best methods of effecting

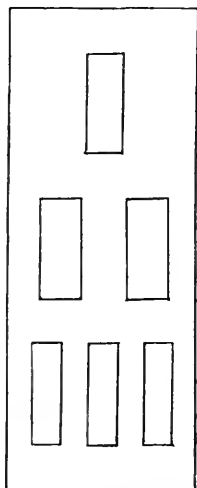


Fig. 3. Use of Mortise Chisel. Exercises from the Strassburg Planing.

this object of training the child through work is to enlist the interest of the child. When a fixed end is set for his exertions, which he himself thinks worth attaining, a strong and effective instrument is gained for the strengthening of the will. Admirable technical skill may, we must acknowledge, be gained by the limitation to formal exercises, but technical skill is not the main thing for which we strive. Moreover, the making of objects of utility by no means excludes, but, on the contrary, demands technical accuracy. We ought to rejoice that the very nature of Manual Training

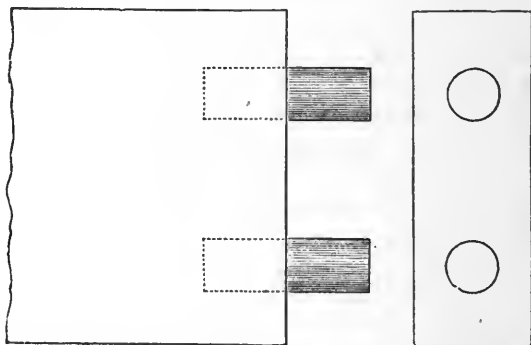


Fig. 4. Exercises from the Strassburg Designs. Dowelling.

allows us to sympathise with the child's endeavours, and enables us at the same time to effect our purpose of educating it. Are we to renounce the natural advantage which our branch of education has over theoretical ones? Is the child never to be allowed to make proper use of the ability it has acquired? The battle between practice and application is the same as the conflict between grammar and reading in teaching language. Some seek in the first place to supply the pupil with grammatical implements. They believe the use of these in reading will come soon enough. Others wish to take advantage of the boy's interest in reading to furnish him with the same implements. They

would teach grammar through reading. Now, exercises carried on as at Strassburg are the grammar of Manual Training. Shall we give the boy nothing but this grammar? Can we expect to keep his interest alive for any length of time with these monotonous exercises, having no other aim in view than the acquisition of technical skill? Should we not rather enter into the desire which the child so openly exhibits to produce some finished, useful, and available thing, when at the same time we obtain our educational aim just as well, and even better? We certainly decide in favour of objects of utility, executed with technical correctness in a graduated, methodical order, *without excluding* preliminary exercises, which, indeed, are necessary for perfect work.

2. Applied Teaching.

As soon as we find ourselves on the ground of what is called applied instruction, the question arises, What sort of things is the boy to be taught to make in the workshop? Playthings? Articles for home use? Or such objects as are in close connection with school instruction, and aid in giving concrete expression to abstract ideas? In my opinion there is no answer that will settle this question definitely and finally. The choice of objects must differ according to circumstances, the age of the pupils, and the kind of work, but it is by no means the most important point, nor one which we need here consider. The chief point is to train the child through practical work. This does not depend so much upon what is produced as on the work itself, and upon what is learned by it. The boy may well see in the object which he wants to make, the aim and end of his work; for his master, however, the product is only a means towards an educational end. It matters little what objects are preferred. We must only insist upon choosing them from the boy's sphere of interest. We must also see they are given

in proper methodical sequence, according to the capacity of the learner, and are such as shall tend to develop it. If these conditions are fulfilled, objects for home use, or for children's games, are just as serviceable as those employed for intuitive instruction in physics, geography, or mathematics. It is quite natural to set younger boys to make toys and playthings, while pupils of higher schools may assist in constructing simple school apparatus. The material used is also relevant to the question. While cardboard-work may be utilised in many ways, the products of wood-work are mainly for home use. Metal-work, again, is of more various application, for here, according to his age, the boy can make simple toys, objects for the household, or apparatus for scientific purposes. Modelling in clay or plastilina, like drawing, furnishes no articles of utility; it serves only to train the eye and hand.

The boys' workshop may thus without scruple take its 'objects' from household life, or, in the case of younger pupils, from children's toys and playthings, without fear of degrading Manual Training. We should rather be glad when instruction thus enters into closer relation with life. The neatly-carved frame which the boy takes home for his father's picture, the flower-stick, on which he learned to use the chip-carver, will harm Manual Training as little as school work suffers from the girl's knitting and pocket-handkerchief hemming. Of course we must not suppose that the boy takes pleasure in such useful objects only. We must be on our guard not to confound the interest which grown-up people take in these things with that of children. Experience shows that boys work with the same pleasure at objects taken from school-life as they do at those for home use. The point is to avoid setting work which they cannot comprehend, and to enter the circle of their ideas. The pleasure of seeing misconceptions born of word-teaching cleared up by the contemplation of real things and by personal experience, and the happiness of being able to follow instruction with more

intelligent understanding, are as great as the satisfaction of making objects for daily use.

It is well known that many schoolmasters desire the tasks to be drawn from school instruction only, for the sake of connecting Manual Training with other branches of school instruction. They take an interest in Manual Training only so long as it goes hand in hand with other subjects, and so long as, through it, children realise practically what they have learned in natural history, geometry, or physics. This leads to the question, whether Manual Training is to be admitted only on account of the service it renders to other branches of education, or whether, in virtue of its peculiar educative influence, an independent position is to be assigned to it in the system of education.

We side with those who take the latter view. Manual Training can neither do its own work nor be an efficient auxiliary to other subjects unless it be methodically organised on an independent footing. Unless Manual Training is to become mere amateur bungling, it cannot possibly depart from the natural method of proceeding from the easy to the difficult. To fit the pupils for good work is more important than the work itself. They must not try to overcome this or that technical difficulty as best they can, just for the sake of finishing a task for school. The elements of work must be practised in graduated sequence. Let us take for a moment the subject of drawing. When, through systematic teaching, the boy has mastered the elements of the art, it is of great use to him in many other parts of his education. Nobody considers that drawing instruction should cease to be taught on an independent basis. It does not draw its exercises from other studies. Neither is it expected to deal with exercises other than in the sequence required for its own method. But, as the child learns to master the language of forms, it becomes able to use the means of expression thus obtained in other branches of instruction. And so it is with Manual Training.

If we start with exercises to be solved for other branches of work, and make Manual Training the slave of theoretic teaching, it is forced to abandon the method proper to itself. A course of instruction in physics, for instance, sets for manual work tasks of very varied degrees of technical difficulty. The making of the objects thus required would probably be interrupted by others needed for mathematics, geography, etc. The boys would have to work with different materials, and to handle many tools, not one of which would they learn to use properly. Further, it not only *may* but *must* happen that tasks will often be set which are beneath the learner's skill, and this will cause his pleasure in the work to flag. On the other hand, he will come across others so difficult that he cannot possibly master them. This leads to his getting outside help, or to his being content with imperfect work—either of these results being educationally bad. In this manner, Manual Training loses its method, and becomes superficial. Our aim, moreover, to train the child through working to work, to industry, conscientiousness, perseverance, and vigorous exertion of the will, cannot be realised under such conditions. The results of our teaching would consist, not of valuable qualities attained by work, but rather of a number of miscellaneous objects and *Anschaungsmittel*, made haphazard as required by this or that subject in the school course.

None the less, Manual Training should prove a valuable ally to other branches of education, provided always that its application to them has been preceded by methodical instruction in the use of the simpler tools. A boy who has mastered the technical elements of work will be able to combine and apply them; speaking figuratively, he will soon learn to read when once he knows the alphabet of work. As in the case of drawing, the application of his knowledge to other subjects will follow as a natural result of its acquirement. But unless we wish to incur the charge of encouraging superficial diletantism, we must not attempt to

begin with difficult subjects. The work must above all be technically correct and faultless. The educational value of such work is far higher than can be obtained by working at objects supplied casually from other branches of instruction. If a definite, graduated method obtain in Manual Training, it will greatly facilitate its admittance into the educational curriculum. Such a graduated course will eventually be more useful to our boys than setting them at once to make Segner's waterwheels and electrical machines, before they have learned to use tools for simple wood or metal work. We should, however, keep constantly in view the connection between Manual Training and the other branches of instruction. For it is through this connection that we hope to secure our ultimate object, the organic incorporation of practical work in the scheme of education. But we must begin the building slowly, and with toil, from the very foundation; it would be folly to commence with the roof. When boys in the upper classes of public elementary schools and those of higher-class schools have enjoyed systematic instruction in manual work,—which aims, we repeat, not at the material product, but at the active development of the child's faculties and their conscious direction to a given end,—then, and only then, will they be able to apply their knowledge to the purposes of general instruction. There will always be opportunities for such application, but the preparation for it must be properly graduated instruction in the elements of manual dexterity.

D. THE FORM OF MANUAL TRAINING—CLASS OR INDIVIDUAL INSTRUCTION?

In Sweden, where bench-work prevails, the classes generally contain not more than from twelve to fifteen boys, because it is considered that such work requires individual instruction. Experience has proved that even a good teacher is not able to keep more than fifteen pupils at a time well

employed, if each is working at a different task, and he has to go from bench to bench, advising here and helping there. This individual instruction is based upon the difference in the practical talents of the boys, the disparity of material and tools, and circumstances incidental to the subject, inasmuch as the work done by one pupil turns out a failure, while another finishes his task quickly and successfully. Many see in the ambition of a pupil to excel his fellows one of the strongest incentives to good work. They accordingly favour a method of instruction which is, in truth, nothing but an imitation of the apprentice system, as it excludes all class teaching. Apart from the fact that it is educationally immoral for a teacher thus to speculate upon the pupil's ambition, it is evident that if Manual Training were only given in the form of individual instruction, it would be a practical impossibility to introduce it into larger schools. But the difficulty cannot be met by any attempt to interfere with the individuality which should characterise all practical work; the result would be purely mechanical labour, such as may be seen in the larger workshops of the Paris schools, where instruction is given *en masse*. In Paris the boys draw the saw backwards and forwards as time is beaten by the teacher, very much as writing is taught on the time-beating system, thick and hair strokes being executed to the word of command: 'One—two! one—two!' No regard is paid to the degree of hardness in the wood or sharpness in the tools, or to the varying strength of the boys. Such military precision cannot be carried into the workshop without depriving the work of all its charm. It is absurd to graft the system of one kind of instruction on to another; each must develop its own system as a natural growth. Here as elsewhere it is the spirit that creates the body. The nature of practical work requires free and easy intercourse in the lessons given in the workshop. It is, however, of vital importance that a large number of pupils should be instructed at the same

time, all making measured progress with their work. What we require is a form of joint instruction which, while it preserves to the work its individual stamp, does not hamper the zeal of the diligent and capable in favour of the slow and awkward. In the German school workshops no effort has been spared to arrive at such a system, and our experience leads us to hope for a successful solution of the problem. The preliminary theoretical teaching naturally bears the character of class instruction. The materials, the tools and their use, have to be discussed; the tasks must be explained by question and answer. Afterwards the individual faculty of the pupil must have its rights. Nevertheless, it is possible to secure the simultaneous progress of a large class. By the help of dissectible models, which show the progress of the work (and later on by well-drawn designs), each boy can work independently. One boy will naturally soon be ahead of the others. In this case supplementary exercises may with advantage be set for those who progress more rapidly. At first the whole class is busy with the same task, but while the less skilled boy exerts his utmost strength to complete it in the most homely manner, the more talented one varies it by self-invented or prescribed amplifications, ornamentations, etc. In this way individuality is allowed to develop itself, the zeal for work does not flag through enforced idleness, and at the same time a progressive educational method is attained. When the same task, or a certain set of tasks, has been finished, as the capacity of the various boys allowed, the latter meet again for new instruction on a new subject or group of subjects. Another means of carrying out class instruction is the instruction of less intelligent boys by the aid of more proficient pupils or monitors. This method is adopted by teachers of gymnastics who have to instruct a large number of pupils. But care must be taken that the assistants do not sacrifice themselves for their companions, that they have opportunities given them to rise in due time to the position

of teachers. Where we are compelled by circumstances to instruct boys of different ages and unequal talents *en masse*, boys of about the same proficiency may be placed in groups and taught in common. This group instruction may be regarded as a step towards class instruction.

E. THE DIFFERENT KINDS OF WORK AND THEIR ESSENTIAL CHARACTERISTICS.

The question, 'What kind of work shall we place first?' we can easily answer by asking another, 'Why are there different kinds of work?' If it be true that the physical and psychical development of the individual is analogous to the phases of development in the race, the practical work of the child cannot have reached the stage of subdivided labour which is that of the crafts in general. For the child, as for the race in its infancy, all that is needful is an acquaintance with the elements of human work. It must be gradually introduced into the world of experience, and learn by observation to know the different materials and the use of simple tools in fashioning them. We must have no guilds in educational work. We want no joiner's, no bookbinder's or locksmith's craft. Our intention is merely to teach the child how to handle the most primitive and plainest tools (hammer, tongs, saw, file, gimlet, chisel, scissors, etc.), and how to perform the common actions of cutting, filing, hammering, sawing, planing, etc. And we must proceed step by step according to the development of the physical and mental powers of the child. We begin in the Kindergarten and pass to the preparatory stage of Manual Training. In the workshop proper the best order will be—cardboard, wood, metal. Next to these comes modelling in clay and plastilina.

In connection with cardboard-work the most important

tools are—the ruler and compasses, lead-pencil, scissors, knife, and folding-stick. The boy here becomes acquainted with simple geometrical laws, with the straight line and curve, and the properties of each, with angles and with surfaces. He passes from the plane, by means of cut patterns, to geometrical solids. Besides the taste for correct and beautiful forms, cardboard-work cultivates a taste for colour. When covering his work the boy learns to arrange primary colours in simple decorative patterns. Moreover, the method of cardboard-work is the most fully perfected. It was early developed by the philanthropic school, and there is quite a respectable literature about it, dating from the end of last and the beginning of this century. Other recommendations are the cheapness of the tools, the possibility of occupying in class work a large number of pupils, and the fact that the tasks set for the practical work can be brought into closest connection with school instruction. For instance, the properties of the cube, the prism, etc., will be thoroughly understood by the boy who has drawn the patterns and folded them, and in whose hands the forms have slowly taken shape. Cardboard-work can easily be carried on so as to become a kind of practical mathematics.

Then follows wood-work, which the younger boys do not begin at the bench, but with the knife, that being the simplest tool. Later on the older boys take great delight in bench-work, to the advantage of their health. It must be acknowledged that this work, on account of the physical exertion required and the constant movement of the body, is the best relief after sedentary school-work, and we could only wish that the pupils of higher schools had more leisure time, that they might experience the advantages of this form of exercise. Moreover, much affectation and conceit would wear off at the bench. The tools for bench-work are certainly the most expensive ones, but in many workshops a

substitute is being sought for the benches, which involve the chief part of the outlay. The high educational value of this form of handicraft has so far asserted itself, that efforts are being made to manufacture special tools suitable for boys. The adaptation of wood-work to the powers of younger boys will thus, among other things, necessitate a digression from the beaten paths of trade.

Wood-work for older boys has already been pretty well organised, as in many places it is carried on upon a large scale. The only difficulty is to instruct a large number of boys in class. It is harder to connect bench-work than cardboard-work with theoretical instruction. The objects made at the bench are better adapted for home than for school use.

Chip-carving, which comes next, is by no means the artistic wood-carving which creates free forms. Boys cannot manage the latter, and it is a great victory that school workshops in this case have given up all such amateur work. Chip-carving is nothing but the decoration of plane surfaces with the knife. It is very similar to the work formerly employed by the Scandinavian peasants, and those of Friesland and Sleswig-Holstein, for the decoration of their household furniture. Its object is to break up the smooth surface into various but strictly regular forms, which can be marked out with ruler and compasses. In the practice of it the hand learns to cut surely, the eye is trained and the sense of form developed by the creation of innumerable designs.

Chip-carving is, in my opinion, not an independent subject but a continuation of wood-work. It affords an opportunity of artistically beautifying the practical, useful work done at the bench. It allows some insight into the realm of the beautiful, without the danger of bewildering the novice. Tools for chip-carving are very simple and cheap. The boys are fond of the work. I have often heard even teachers at

the end of the lesson in a training course say, 'What a pity it is to have to stop just at the most interesting point!' A passionate love for work can be excited by these simple chip-carvings, and therefore I consider them an excellent means for encouraging diligence. Another characteristic which gives it superiority over other branches of manual work is, that it stimulates and satisfies the desire to create and shape new forms. The profusion of forms which can be produced by this Frisian chip-carving is almost endless, and incites to ever-renewed activity. It is true that the forms are but fresh combinations of the same elements of form; yet these result in such charming decorations, and such a rich world of ornament can be called into being, that we ought to encourage chip-carving because of the love of creative work which it engenders. Lately these carvings have been coloured. The cut surface is painted over with opaque colours in such variety as the pattern may demand. The forms are thus thrown into higher relief, and an opportunity is given for developing and stimulating the sense and love of colour. All in all, I consider the art of chip-carving a very successful artistic complement to bench-work.

It is true that an objection has been raised against chip-carving of which we must take notice. Does it not add to the dangers which threaten the eyes of our children? It would be wrong if the promoters of educational Manual Training were to disregard this grave objection. But it is not vital. In the hands of enthusiastic, eager boys there is, of course, a danger of chip-carving becoming too delicate and minute. It is the duty of the teacher, therefore, to be on his guard and prevent the introduction of such detail work as might cause short-sightedness. If we allow cuts of normal size only, if we exclude short-sighted pupils from chip-carving, if the pupils only work in a good light and draw the patterns distinctly with a sharply-pointed

black pencil, if we bring chip-carving into organised connection with bench-work, so that the objects are not only prepared for carving, but, when carved, are put together by the pupils; if planing, sawing, filing, etc., are allowed to alternate with drawing and cutting, there is certainly not the least danger to ordinary eyes. It is unnecessary through exaggerated anxiety to exclude a branch of work which is in other respects so exceedingly valuable.

The cardboard and wood-work of which we have spoken have gained most ground in our school workshops, and they will most likely in future be the principal work in all such places. The other forms of manual work which have proved most useful in the training of hand and eye are easy metal-work and the moulding of clay or plastilina—modelling, as it is called.

Metal-work is generally considered difficult, but it is not so when correctly and methodically arranged for boys of from eleven to fourteen years old. From experience, we should say that pupils are particularly interested in this work with hammer, pliers, file, and soldering iron. It is the very peculiarity of the material and its treatment, with the variety of combinations possible, that attracts the boy. The work is especially suitable for pupils of higher schools, who are enabled by it to construct simple physical apparatus. Moreover, it acquaints the pupil with the properties of a material that is of the greatest importance in art. New tools have to be used; and the means of joining metals by soft and hard soldering, riveting, etc., are so peculiar, that they cannot be replaced by wood-joining. To my mind, metal-work fully deserves to be included in the province of educational Manual Training, and the consecutive order of materials—paper, cardboard, wood, metal—would seem to correspond to the development of capacity in the learner.

Last comes moulding. Here we must not by any means think of the free work of an artist; our moulding stands rather in close relation to school drawing: it is drawing, so to speak, in space. And it is as supplementary to drawing that it must be regarded. The boys shape with the modelling-knife in plastilina¹ accurate and regular, but not free, artistic forms, for that would lead to inferior amateur work. The figures which are represented in drawing on the flat with the pencil are abstractions, but in moulding the child shapes simple solids as they really are. The eye is schooled by the faultless execution of these forms, and so also is the hand which makes them. The simple, elementary forms, consisting of regular geometrical figures, are afterwards embellished by the boys according to their taste, just as in chip-carving. Again, the subjects set may be treated in various ways by the different boys. The solids which have been formed in plastilina are afterwards moulded in plaster of Paris in order to preserve them.

One of the first questions asked in regard to any kind of Manual Training is, 'Can it train hand and eye?' To this we must answer that modelling is an occupation pre-eminently suited for the purpose, though it does not bring the muscles so thoroughly into action as bench-work does. Of course the products of modelling are of no use in the home, and therefore the art will probably be less practised; but, on the other hand, it is closely connected through drawing with the other branches of school instruction. Cardboard, wood, and metal-work open up to our boys the industrial world; modelling affords an initiation into the language of art, and a glimpse of the world of beautiful forms.

¹ Plastilina, clay prepared so that it will always keep soft and mouldable.

VII.

THE PRACTICE OF MANUAL TRAINING.

A. WORK OF THE PREPARATORY GRADE.

LITERATURE: Barth and Niederley, *Des Kindes erstes Beschäftigungsbuch*, 4th edition, Bielefeld and Leipzig, Velhagen und Klasing, 1891; Bertrand, Toussaint et Gombert, *Le Travail Manuel à l'École et dans la Famille*, Paris, Lecène, Oudin et Cie., 1890; Dumont et Philippon, *Guide Pratique des Travaux Manuels*, Paris, Ve. P. Larousse et Cie., Cours élémentaire; Hertel, *Papparbeiten*, Vol. I. (Vorstufe), Gera, Theodor Hofmann, 1889; Vera Hjelt, *Slöjdlära för de små*, Helsingfors, Edlunds Förlag, 1886; Hugo Elm, *Spiel und Arbeit*, Leipzig und Berlin, Otto Spamer, 1885; Kalb, *Unterricht in der Handarbeit für Knaben von 6 bis 10 Jahren*, Gera, Theodor Hofmann, 1889; Kalb, *Die Knabenhandarbeit für das Alter von 6 bis 10 Jahren*, Bericht der Lehrerbildungsanstalt für Knabenhandarbeit auf das Jahr 1889; Mme E. Liétout, *Cours Pratique de Travail Manuel*, Paris, Gédalge, 1889; A. Planty, *Cours de Travail Manuel*, Cours élémentaire, 2nd edition, Paris, Gédalge, 1888; George Ricks, *Hand and Eye Training*, Book I., For Boys and Girls, 3rd edition, London, Cassell & Company, 1890; Fr. Seidel und Fr. Schmidt, *Arbeitsschule*, 10 parts (sewed), Weimar, Böhlau, 1886.

For children of from six to eight years of age, Gustav Kalb suggests such tasks as are in close connection with Fröbel's occupations for the Kindergarten. Some of the latter exceed the understanding of Kindergarten pupils, especially those in which the child has to change the form according to his own ideas. If such occupations are given to them, we have a right to say that overwork is

already introduced into the Kindergarten. But it was by no means Fröbel's intention to limit his Kindergarten games and occupations to those of the age of from four to six. Certain social circumstances alone have prevented the school proper from having the benefit of them. Thus, the endeavour to adapt the preparatory course to the school workshop is a direct furtherance and development of Fröbel's ideas.

We will first speak of those occupations which teach form, but in which there is no re-modelling of the material, either with hand or tool. The object rather is to make new forms by combination of materials already shaped and prepared, such as sticks for stick-laying, sheets for folding, strips and pieces of paper for plaiting. First of all, as the nature of the materials suggests, the forms are made on the plane. Stick-laying, a kind of outline (geometrical) drawing with tangible lines, is a suitable beginning. It allows numerous exercises in forms taken from the beautiful in art and life. Here the child becomes acquainted, by practical experience, with the simplest relations of measure, and with elementary geometrical ideas, such as those of the point, the straight or non-straight angle, the right or oblique angle, perpendicular and horizontal, square and triangle, etc. Stick-laying can take the form of visible or rather concrete arithmetic: the children add and subtract, multiply and divide, as it were, with tangible quantities. But it is above all a preparatory training for drawing.

Paper-folding is another very useful exercise for cultivating a knowledge of form. It trains the child to skilful and exact work. Here, again, many of the Fröbel occupations are not fit for young children. By transplanting them into the elementary grade of Manual Training we gain more time in the Kindergarten for the indispensable *Bewegungsspiele*, and for working in the garden with shovel and wheelbarrow. Before a child is of (German) school age (six), it is hardly able to understand all the folding forms. Later on, children

delight in the many new combinations of forms they are capable of producing with their little hands. The observations they thus make afford excellent preparation for instruction in geometry, and especially in drawing. Consequently paper-folding and drawing have already been organically combined. That is, the child must first fold all the forms in paper and then draw them. In this *self-construction of drawing designs* we have, it is evident, a most suggestive thought. It is clear that the child will understand the forms which it has made for itself better than strange objects placed before it by others. It has, as it were, realised them with the touch. They stand in the same relation to ready-made designs as experiences stand to dogmatically transmitted knowledge, acquired by memory.

The more difficult exercises in plaiting with paper, linen or cloth, and in the interweaving of shavings, also belong more fitly to the elementary stage of Manual Training proper than to the Kindergarten. Useless there, the products may be employed in decorating the work of the *Vorstufe*, especially the easier cardboard and pasteboard work.

Work on a plane surface is followed by practice in combining the form-elements it has yielded into the outlines of solids—pea and cork work, as it is called. This is an extension of stick-laying, the little wooden laths being fastened together, but no longer in the same plane. Joined at the ends by bits of cork or soaked peas, they constitute the edges of solids. Further particulars of this work, as well as of the developments of Fröbel's suggestions already mentioned, will be found in Seidel and Schmidt's *Arbeitsschule*.

The preparatory stage also includes simple paper and cardboard work, done with the scissors. The use of the latter is best taught in the cutting-out of pictures. This exercise is of high educational value, because both hands—the one cutting and the other turning the picture—

are rendered dexterous, and the eye schooled to perceive form accurately. The child is forced to work with concentrated attention, when hands and eyes alike are kept busy.

Paper-work proper comes next, which leads us to the use of that important instrument, the foot-rule. This work trains to carefulness and accuracy, for exact measuring and drawing are indispensable to success. Thus, first of all, the boy learns by experience the use of the ruler, and how to handle square and compasses. Cutting with the scissors is succeeded by the use of the knife. The field thus laid

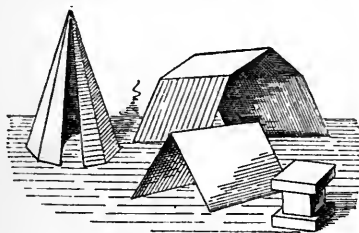


Fig. 5. Paper and Cardboard Work of the Preparatory Grade
Tents and altar.

open for the activity of the child is exceedingly productive. (Figs. 5 and 6.) The child learns with delight to make many ornaments for the Christmas-tree (festoons, stars, little baskets, paper bags, etc.), or playthings, such as the wind-mill and balloons; whilst various objects of utility can be made from cardboard, such as candle-guards, little boxes, book-markers, cotton or silk winders, pocket-books, etc. Paper-work can, moreover, be pressed into the service of school instruction. If we wish to make the child acquainted with lineal and square measure through the medium of its eyes, we give it, for example, a piece of cardboard one decimetre square. It marks the ten centimetres off along the right and left edges, draws lines across the card to join

the points of division, and then cuts the card into ten strips, which it pastes together so as to overlap a given distance. With such strips rings can be made and linked together in chains. The fifth, tenth, and fifteenth rings may be of different colours. By this the child becomes acquainted

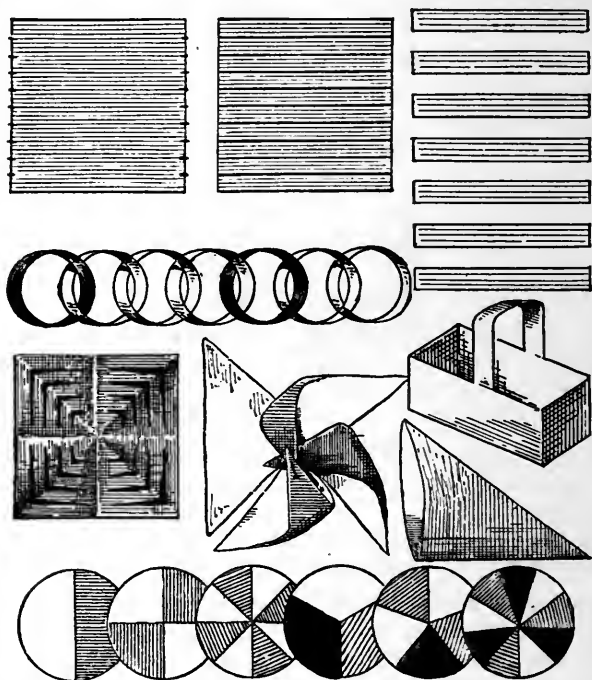


Fig. 6. Paper and Cardboard Work of the Preparatory Grade. Squares with centimetre divisions. Rings. Christmas-tree mats. Wind-mill. Basket. Paper bag. Discs to illustrate fractions, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$.

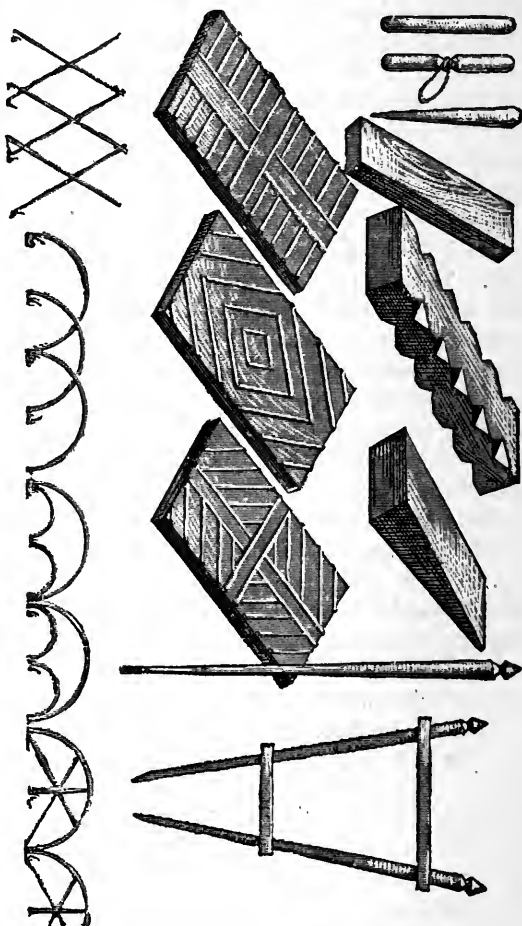
with our system of counting. The so-called fractions-disc to illustrate fractions is serviceable in arithmetic lessons. By means of it the child is able to acquire a clear idea of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, etc. Another task is the cutting-out

of elementary geometrical forms, and pasting them into designs, such as are used in drawing. We may also mention the cutting and pasting together of different-coloured pieces of paper to illustrate local geography (as in a plan of the schoolroom, or of the schoolhouse, the garden, etc.), by which the child is prepared to understand a map. Lastly follows geometrical paper-cutting in subordination to mathematical instruction, according to the method illustrated by Hertel in the Introductory Part of his *Papparbeiten*.

Besides paper, cardboard, and easy pasteboard work, we include in the preparatory stage the simplest manipulation of wood. The knife is most used, the file, gimlet, and draw-knife coming next. For splitting wood and cutting out simple outlines we employ the fret-saw. Instead of the expensive bench, we have a parallel vice of hard wood. The parts of the work are joined by nails, and the boy thus learns the use of the hammer and pincers. G. Kalb, by his little book mentioned above, has done a great deal towards the furtherance of this elementary form of wood-work. The children learn in due course to split the wood; they make notches of given measure in the edges of pieces of wood (Fig. 7, page 112); they cut parcel-holders, round sticks with notches in the middle, flower-sticks, flower-labels, pegs, wedges, and little laths which are afterwards put together to form railings, or the well-known toy, the shears. Of smooth, half-round (split) and round, sticks they make little garden-borders. They split withies and plait them into sides for their toy waggons or ramparts for their lead soldiers. A combination of sticks produces a sort of ladder for training plants. The nailing together of split laths in patterns is a good exercise in using the hammer. Objects can thus be made for children's games, such as swords, kite-frames, bows and arrows, and boats. With the fret-saw stars for thread-winders, labels, furniture for dolls' houses, brackets, stands for flower-pots, boxes, etc., may be made. In fact, the field for employing the child's faculties is

here an exceedingly large one, and it has been cultivated not only in Germany, but also in the Northern countries. Miss

Fig. 7. Woodwork of the Preparatory Grade.
 Round-wood. Parcel-holder. Peg. Rectangular solid. Carving of edges. Wedge. Flower-stick. Double climbing-stick for plants. Nailing on of split twigs into patterns.



Eva Rhode at Gothenburg, and Vera Hjelt at Helsingfors, have rendered good service in simplifying wood-work, and in causing the introduction of tools suitable for children's hands.

Moulding should go on side by side with other preparatory work. It consists in forming solids out of a plastic material, such as clay or plastilina. Such solids are made with the fingers or hands, or with a very simple tool, the modelling-knife. Here we do not combine elementary forms supplied for the purpose; on the other hand, no instruments, except the hands themselves, are essential. Of the more advanced *modelling* as an object of Manual Training we will speak later; at present we have only to do with the introductory shaping of forms by younger boys, which has always been cultivated by the followers of Fröbel (see the *Arbeitsschule* of Seidel and Schmidt), and which Theodor Sonntag at Leipzig and Franz Hertel at Zwickau have lately done much to develop.

Sonntag was the first to avail himself of the boy's 'box of bricks' for educational purposes, requiring him to make his own bricks, and not merely to put them together. The result is that the child is not restricted to forms given him in a box, but can follow his own fancy in creating them. By this creative occupation he is induced to observe the architectural elements of his surroundings more closely, and to form a clear idea of them. Sonntag advises (see *Blätter für Knabenhandarbeit*, 1891, No. 5) that modelling clay should be used for the bricks. This is clay mixed with scouring sand in the proportion of 100 grammes of clay to 50 grammes of sand. The composition makes the work look like stone, and is harder than clay alone. Colours may be added to the mixture later on, ochre (light and dark) for yellow tiles, English red or mahogany-brown for red stones, and ultra-marine for slate. By this means the effect of the work is enhanced.

The necessary apparatus for making brick or stone shapes is as follows: (1) Eight guides, or moulding strips of beech-wood. The length of each is 30 cm., the breadth 2 cm. They only differ in height; two strips should be $\frac{1}{2}$ cm.; two, 1 cm.; two, 2 cm.; and two, 3 cm. high. (Fig. 8.) Holes

are bored close to the ends of the strips. (2) A modelling board of beech-wood, 30 cm. \times 20 cm., and proportionately thick. Close to the ends of its shorter sides, holes 2 cm. deep must be bored to correspond exactly with the holes in the strips. Iron brads fasten the strips to the board. The distance between any two holes is 1 cm. In the sketch below two guides are shown already fastened to the modelling board. (3) Two moulding or modelling tools of beech-

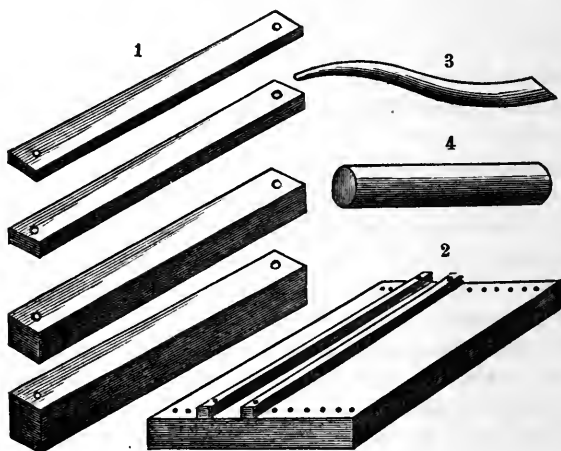


Fig. 8. Tools for Stone Brick Modelling.

(1) Guides. (2) Moulding board. (3) Modelling tool. (4) Roller.

wood. (4) A roller of hard wood. (5) A pallet for mixing the colours with the clay. (6) A thin, straight, pointed knife. (7) A pair of compasses. (8) A vessel for mixing the clay. (9) A washing-tub.

A set of the above implements (excepting compasses and washing-tub) costs about three shillings; the cost of material for one pupil, taking two lessons a week, amounts to about sixpence per half-year.

In this occupation the child must first work out the

rudimentary exercises, and must especially make itself familiar with the treatment of the clay. Then, in each lesson a rudimentary form is made, which is obtained by pressing the clay between two of the guides fastened on the board at certain distances from each other.

These distances, as well as the height of the guides selected, are regulated by the dimensions of the bricks to be made. When the guides have been made fast, the space between them is filled with clay from one end to the other. This done, the superfluous clay is removed with the knife, and the surfaces smoothed by passing the roller quickly over it. In doing this the roller must be firmly held. Thus, a quadrangular prism or pillar of clay is produced, which can be further manipulated when it is a little dry. The work is continued by cutting the clay into smaller parts, the size of

the single bricks required. This is done by marking the length of the bricks on both longitudinal edges of the upper surface, and then cutting the clay steadily at the marks of division. Of course this is an often repeated exercise.

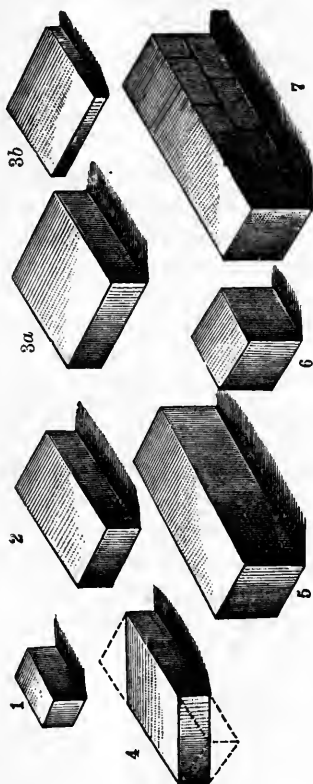


Fig. 9. Brick-moulding according to Sonntag.

In the sketches appended (Figs. 9-12) we give some specimens: (1) Quadrangular prism or pillar, 1 cm. broad and thick, length 2 cm. Several specimens will have to be made of each exercise, and then similar blocks, but somewhat longer, are made. (2) Tile, breadth 2 cm., depth 1 cm. (3*a*) Slab, breadth 3 cm., depth 1 cm. (3*b*) Square slab, breadth 3 cm., depth $\frac{1}{2}$ cm. (4) Rhomboidal slab. (5) Block, breadth and depth each 2 cm. (6) Cube, edge 2 cm. Having made all these objects, the pupil may pass on to colouring the clay. The bricks may be ornamented by paring the edges off or cutting notches in them. Round objects are next made. The variety of forms that may be produced becomes greatly increased, and the pupils may also begin to choose more independently for themselves. Great value is attached to exact rectangular work in these objects. We will give some further specimens: (7) Tiled wall. (8) Semi-circular slab. (9) Arch. (10) Circular slab. (11) Ring. (12) Window-sill. (13) Cube, perpendicular edges pared off. (14) Block, the front edges pared off. (15) Block, its front edges rebated. (16) Plinth. (17) Pointed arch-stone. (18) Round arch with wedge markings. (19) Coping-stone. (20) Hexagonal prism.

The pupil may now proceed to give the forms character by using the knife on the soft clay. For example: (21) Factory chimney with coping-stone. (22) Gutter-stone. (23) Gable. (24) Tiled roof. (25) Slate roof. (26) Pyramid. (27) Window arch. (28) Double arch. (29) Large blocks chiselled. (30) Pillar-coping with sphere. (31) Ornamental pillar.

Finally he may add decorative objects, etc., for example: (32) Doorway heading. (33) Window-sill. (34) Sign for smithy. (35) Sign for baker's shop. (36) Outside wall with tracings let in or raised.

Sonntag suggests (for reference, see above) that brick-moulding should be followed by a series of examples in the so-called 'free moulding,' which aims at the reproduction

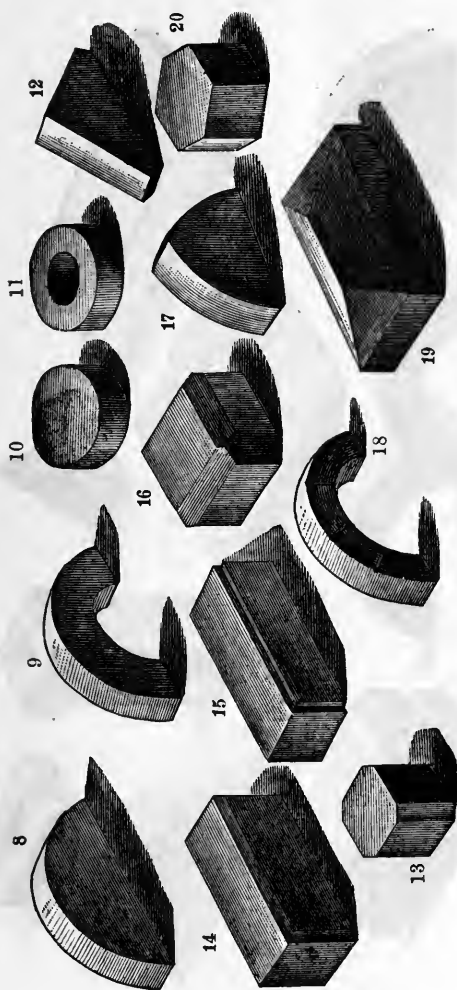


Fig. 10. Brick-moulding according to Sonntag.

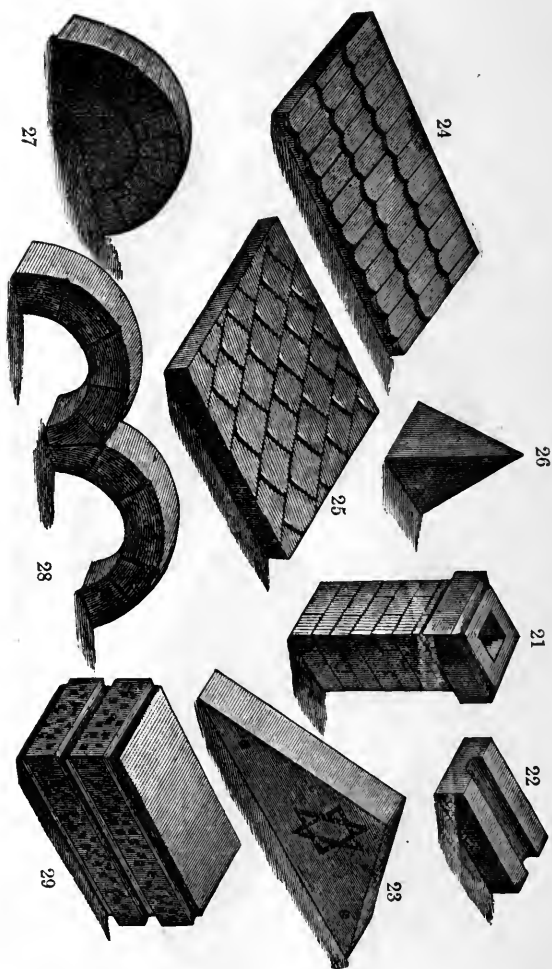


Fig. 11. Brick-moulding according to Sonntag.

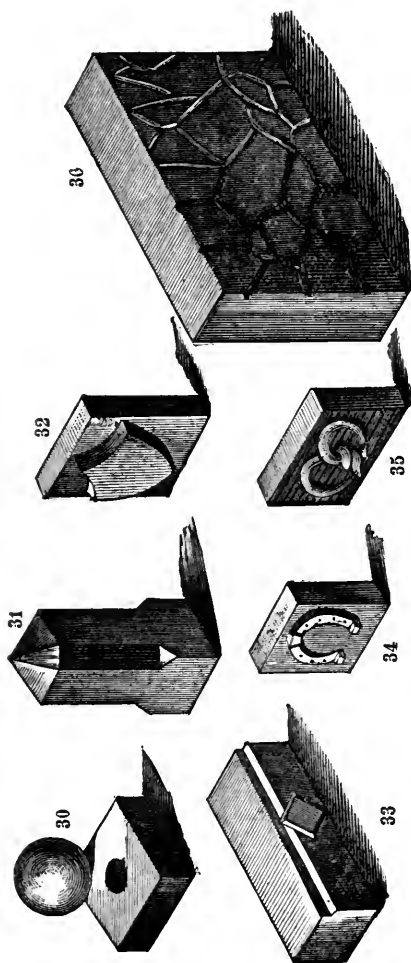



Fig. 12. Brick-moulding according to Sonntag.

of objects from nature or from industrial art, and so at inducing an accurate perception of form. It fills up the time while the clay used for brick-moulding is drying, and uses up the waste clay. As this free moulding is in accordance with Fröbel's system, we take it for granted that it is known, and abstain from giving examples. But of the brick-moulding which Sonntag has suggested and reduced to practice we have given a detailed account, because work of the preparatory grade is so considerably enriched thereby, that it deserves to be made more widely known.



Hertel advocates moulding as bringing the pupil by his own self-activity into closer acquaintance with the world of form (see *Blätter für Knabenhandarbeit*, 1891, No. 7 Supplement). 'In creating forms the pupil intensifies, determines and systematises his conceptions of form. The development of any accurate and vivid concept is greatly assisted by embodying such a concept in suitable concrete form. Outlines traced or marked in relief on moist sand, drawings of different and characteristic aspects, sectional drawings, all further this object. Verbal definitions, moreover, though last, should not be neglected.' The mission of the work-school, according to Hertel, is the development of the perceptive and creative powers of the child. The means for the fulfilment of this aim are, instruction in the proper perception of objects, the actual reproductive embodiment of what is perceived, the transformation and development of these into new forms, the copying of form outlines with prepared material, as well as instruction through language.

For the training of sight and touch—senses of such vast importance for the whole intellectual development—we have simple means of representation which can easily be directed to the object in view, such as moulding, the reproduction of outlines with given materials (sticks, rings, etc.), and most abstract of all, drawing. The cultivation of these belongs to the province of Manual Training. The work-

school has to employ these means, and by their application to develop the perceptive and creative powers of the child.

For this purpose the child must be induced to take an interest in representative specimens of whole groups of objects, so that it may be enabled to perceive and reproduce them. The representative specimens are drawn from the observation of geometrical solids, and present themselves as the fundamental forms of all the products of nature and art. The work-school will find plenty to do in dealing with and illustrating these forms until the child is about ten years old. The forms must be divided into four groups: (1) Sphere, cylinder, cone. (2) Cube, prism, pyramid. (3) Oval and ellipsoid. (4) Transition forms. (For particulars see *Bericht der Lehrerbildungsanstalt, etc.*, for 1889: Hertel, *Die Auswahl des Stoffes und die Gewinnung der Form in der Arbeitsschule.*)

Moulding or form-making thus comprises the whole domain of the child's material surroundings, grouped round mathematical forms. It corresponds to 'the faculties and requirements of the pupil. (Without any risk to the child, and without straining the immature powers, it keeps hand and eye in continual action and reaction.) It joins forces with the natural facilities for concept-making, and suggests a whole series of materials with which to demonstrate such concepts tangibly. It animates the child's powers of imagination in the orderly transformation of such material, and in the arranging by groups and sequences of the reproductions and drawings of the objects made. Form-making is also advantageous to schools. Arising on neutral ground, it has the same pursuits, it augments the means suited to these pursuits, and must be of great use for instruction in local geography, physics, geometry, geography, the history of civilisation, and more especially in drawing in all its different branches. Of drawing, indeed, modelling is the *natural foundation*. It promises to free it from the one-sidedness of

ornament-drawing, and from the artificial characteristics of pattern-tracing.'

Hertel urgently recommends plastilina rather than clay as the best material for moulding. Regarding the details of his course, we must refer our readers to the account given in *Bericht, etc.*, for 1891. It is to be hoped that Hertel's deep and thorough study of the subject will materially further instruction in moulding.

B. CARDBOARD-WORK.

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¹ The Publishers have undertaken to procure these works to order.

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[The above for the use of the teacher.]

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Fifteen bookbinder's folding-sticks, at 3d. ,, . . .	3	9
Fifteen cutting-boards, medium, hard wood, 14 × 10", at 1s. 8d. ,, . . .	25	0
Ten rulers, polished steel, 30 cm. long, at 1s. 6d. ,, . . .	15	0
Six angles, do. 27 × 17 cm., at 1s. 9d. ,, . . .	10	6
Six angles, 35 × 22 cm., at 2s. 3d. ,, . . .	13	6
Fifteen pairs of brass compasses for lead pencil, at 1s. ,, . . .	15	0
Fifteen wooden rulers prism Δ with knob, 30 cm. long, 6d. ,, . . .	7	6
One pair of steel compasses, 15 cm. long, . . .	0	9
One hollow punch, . . .	0	4 $\frac{1}{2}$
One pair of eyelet punch pliers, . . .	1	6
One French sharpening stone, in box, . . .	1	6
Two best glue-pots, with water-bath and brass fittings complete, at 6s. 6d., . . .	13	0
Two glue brushes, 1 at 4d., 1 at 8d., . . .	1	0
One enamelled paste-pot, with scraper, . . .	1	6
Two paste-brushes, 1 at 2d., 1 at 4d., . . .	0	6
One large tinned iron plate for brushes, . . .	1	0
Twenty-five stitching needles, . . .	0	6
One hammer, . . .	1	6

	s.	d.
One brad awl with polished handle,	0	3
One English firmer chisel with handle, 10 mm.,	0	8
One flat file and rasp, do.,	1	3
Five wooden cylinders,	3	6
One for napkin-rings,		
Two for pen-boxes,		
Two for litre measures,		

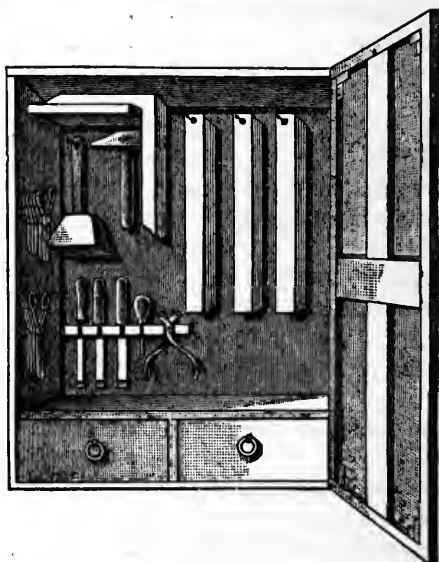


Fig. 13. Tool Cupboard.

The arrangement of the tools may be seen in the tool cupboard (Fig. 13), described by E. Meyer, Dresden, in the *Blätter für Knabenhandarbeit*, 1891, No. 6.

With a view to carrying the practical occupation of the boy into his home, it is desirable that each pupil should supply himself with those tools which he must always have ready at hand. If this is done, the cost of the fitting up of

the workshop is lessened. Such tools are: A bookbinder's knife, a pair of scissors, a foot-rule, a folding-stick, a good drawing pencil, and, for more advanced pupils, a pair of compasses with lead pencil. The costs of these tools, without the compasses, amount to about 2s. 8d.

Materials for Cardboard-Work.

(1) Cardboard. The most suitable cardboard for boys' work is made of wood (wood pulp boards), because it can easily be cut, and does not crease. It is sold by weight. A cwt. costs about twelve to fifteen shillings. In Germany the weight also fixes the name given to the particular kind of wood pulp. Thus, 'sixty' wood pulp has sixty sheets to the half-cwt. The physical strength of the pupil must determine the quality of cardboard chosen for the work. 'Sixty' and 'seventy' cardboard are the kinds most used in boys' workrooms.

(2) Calico or bookbinder's cloth in different colours. Calico is used especially for binding edges and for backing. Price from 6d. to 8d. a yard.

(3) Parchment Strips for Adjustable Covers. Cuttings may be bought of large bookbinders at about 1s. 8d. a pound.

(4) Paper. Stout blue paper for binding; unbleached for bottoms; boards for lining; marbled paper for covers; glazed paper. The prices vary, but are all very moderate. Fancy paper for the finer work of more advanced pupils is bought by the sheet. As a rule, the cheaper papers are quite good enough even for artistic work. The best kinds of paper must only be used for the very finest work. Gilt and leather borders for ornaments. A dozen borders are to be had for 2½d. or 3d.

(5) Various materials. Cotton ribbon of different colours for portfolios. Brass rings.

Paste or Glue?

Young boys should begin by using paste. They work slowly, and the glue sticks fast to their awkward, nervous little fingers, so that they cannot avoid soiling and tearing the paper. Paste is made of starch, of which the cost per pound is 4d. By degrees boys become accustomed to work with glue. One pound of glue costs from 5½d. to 8d. Before use, it must be soaked in cold water.

The whole expenditure on material for one pupil is—with careful management—about 1s. 6d. in half a year, for two lessons weekly.

Course.

Courses of cardboard-work for boys are given in the works mentioned above (under Literature): Calozet, *Le Cartonnage Scolaire*; Gelbe, *Papp-und feinere Holzarbeiten*; *Handfertigkeitvorlagen der Leipziger Schülerwerkstatt*; Hertel, *Papparbeiten*. We must also mention the models for paper and cardboard work, designed and executed by teachers in the Dresden workshops; the course for cardboard-work, arranged according to the kind of work, by Emil Meyer of Dresden; and the scheme given in *Die Schulwerkstatt* by Alois Bruhns, Vienna, Alfred Hölder, 1886.

Courses of cardboard-work for the training of teachers are described in the *Bericht, etc.*, for 1889, as well as in the work, *Vorlagen für den 7^{ten} Schweizerischen Lehrerbildungscursus für Arbeitsunterricht*, arranged by S. Rudin, H. Magnin, and Arthur Barbier.

It is naturally impossible to exhibit all these courses here, and to compare them critically. It would be equally impossible to describe the process of production in even a single course; for all experts know that words may assist practical instruction, but cannot replace it. As in all

similar cases, the work must be done first by the teacher, then repeatedly imitated by the learner. I therefore merely give the graduated scheme of work followed by the boys of the Leipsic school (pp. 128, 129).

The series is the result of many years' experience, and has been for long in practical use, though there have been occasional modifications and changes in the sequence of the objects. In connection therewith a few articles may be selected as specimens of that course, and illustrated by drawings. (Figs. 14-19.)

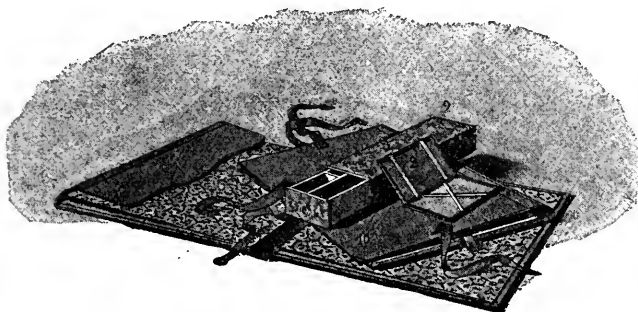


Fig. 14. Cardboard-Work from the Leipsic Course.
Magic Pocket-book. Penbox. Plain Portfolio. Portfolio with
pocket and flap.

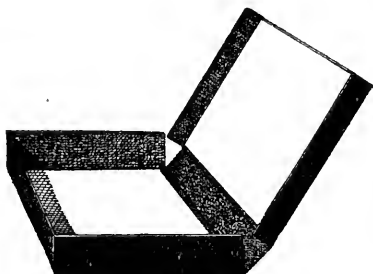


Fig. 15. Cardboard-Work.
Album Case.

I. TASKS OF MODERATE COMPASS.—CUTTING-OUT, COVERING, LINING

GRADER.	PRELIMINARY EXERCISES.	SURFACE WORK.	SOLIDS WITH PERPENDICULAR SIDES.			CIRCULAR SURFACE.	SOLIDS WITH SLOPING SIDES.	STITCHING AND CUTTING.	BACKING.
			Open Solids.	Closed with a Lid.	Completely Closed.				
LOWER GRADE.	Paper cutting. Cardboard cutting. Measuring. Handling of the square. Pointing lead pencils. Knife-sharpening.	Notice-board. — Magic pocket-book. Do., with cross ribbons.	Box for minerals.	Square box. — Box with sliding lid	Cube. — Money-box.	Lamp-mat (bordering).	Hexagonal card-tray.	Copy-books (label).	Plain portfolio with ribbons. Portfolio with pocket and flap. Letter-holder.

II. TASKS, ON A LARGER SCALE,

INTERMEDIATE GRADE.									
		Bordering: Almanac. Time-table. Memorandum. Slate for the kitchen. Plan of the school-room. Mounting of maps on cardboard.	Box for minerals with bordering. Decimetre cube.	Pen box not bordered. Do., bordered with calico.	Bordering: Cube. Tetrahedron. Grass-hopper's house.	Hexagonal and octagonal card-trays, bordered at top and bottom with calico. Hexagonal card-tray with curved outlines.		Mounting a map on linen; case for it in form of a book.	
								Diary.	Adjustable cover. Album case. Needle-book. Writing portfolio.

III. COMPOSITE TASKS.—JOINING

HIGHEST GRADE.									
		Magic pocket-book, post-card size (bordered). Puzzle-book. Relief-maps.	Wall-match-box. Wall-basket.	Knitting basket. Hexagonal box. — Box for postage stamps.	Die. Money-box.	Mat for lamps with paper plaiting. Octagonal card-tray with curved outlines.	Hexagonal card-tray, in and out sides bordered with calico.	Book-binding.	Pocket-book. Portfolio, adjustable sides and bottom. Letter-holder. Sham book.

IN THREE CONCENTRIC CIRCLES.

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STITCHING, AND JOINING OF CARDBOARD COVERS WITH CALICO.

ROUND SOLIDS.	COMPOSITE SOLIDS.	MATERIAL.	CEMENT.	ORDER OF WORK.	TIME.
		Plain and thin papers, especially pressed paper and marble paper.	For the inner sides paste. From the 5th exercise (at the latest) glue for outsides. For small surfaces glue, whenever possible.	<p>The order is determined by the difficulty of the work.</p> <p>LOWER GRADE.</p> <ol style="list-style-type: none"> 1. Notice board. 2. Magic pocket-book. 3. Do., with cross ribbons. 4. Box for minerals. 5. Square box. 6. Box with sliding lid. 7. Cube. 8. Money-box. 9. Mat for lamp. 10. Hexagonal tray. 11. Copybook. 12. Plain portfolio with ribbons. 13. Portfolio with pocket and flap. 14. Letter-holder. 	Matter for $\frac{1}{2}$ year, at two lessons a week.

AND ROUND WORK.—BORDERING.

Napkin ring. Litre measure, low. Litre measure, tall. Pen-case, round.	Thicker paper; as before, mostly pressed and marble paper. Calico. Parchment.	Glue for all outsides. Only slow and less skilful boys ought to be allowed to use paste for the inner surfaces of objects.	<p>Order of work in the main on the same principle, but with more variety in the sequence.</p> <p>INTERMEDIATE GRADE.</p> <ol style="list-style-type: none"> 15. Almanac. 16. Time-table. 17. Die. 18. Tetrahedron. 19. Memorandum slate. 20. Map of school-room. 21. Mounting of maps on card. 22. Decimetre cube. 23. Pen-box. 24. Grasshopper's house. 25. Diary. 26. Hexagonal and octagonal card-trays. 27. Map on linen, with case. 28. Adjustable cover. 29. Needle-book. 30. Album case. 31. Napkin ring. 32. Litre measure, low. 33. Litre measure, tall. 34. Pen-box, round. 35. Writing portfolio. 	Matter for about a year.
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OF BOX AND LID WITH CALICO.

Camera kaleidoscope.) Dollar box with calico or grey linen covering.	Small box. Glove box. Workbox. Casket.	Finersorts of paper chosen according as they are needed. Calico.	<p>Glue. (Such work excluded as requires a different cement.)</p> <p>Selection of tasks similar to the</p> <p>HIGHEST GRADE.</p> <ol style="list-style-type: none"> 36. Wall matchbox. 37. Magic pocket-book. 38. Puzzle-book. 39. Hexagonal card-tray (in and outside bordering). 40. Octagonal card-tray, with curved outlines. 41. Relief map. 42. Pocket-book. 43. Knitting basket. 44. Hexagonal box. 45. Die. 46. Money-box. 47. Box for postage stamps. 48. Map for lamps, with plaiting. 49. A small box. 50. Collar box. 51. Letter-holder. 52. Book coverings. 53. Wall basket. 54. Glove box. 55. Portfolio, adjustable sides and bottom. 56. Sham book. 57. Workbox. 58. Casket. 	Matter for $\frac{1}{2}$ years.
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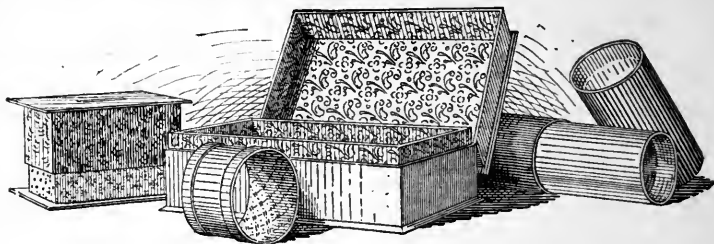


Fig. 16. Cardboard-Work.
Composite box. Round pen-case. Napkin-ring. Money-box.

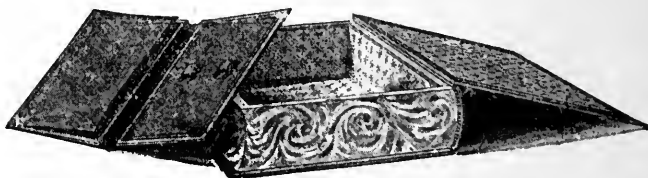


Fig. 17. Cardboard-Work.
Sham book. Note-book cover with pocket.

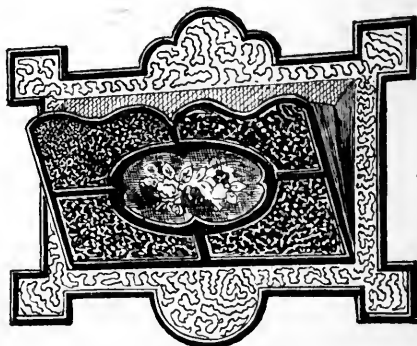


Fig. 18. Cardboard-Work.
Letter-holder.

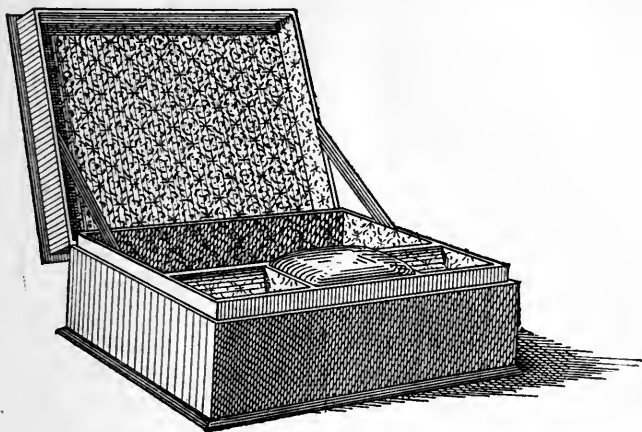


Fig. 19. Cardboard-Work.
Casket.

C. WOOD-WORK DONE WITH THE KNIFE AT COOPER'S AND
CARPENTER'S BENCHES.

LITERATURE:¹ Besides such books named in the general literature of Manual Training and under the heading of the preparatory grade, as treat of wood-work, we may mention the following special works and collections of designs: Compton, Alfred G., *First Lessons in Wood-Working*, New York and Chicago, Ivison, Blakeman & Company; Cranz, Professor H., *Vorlagen für Arbeiten aus Cigarrenkastenholz*, Esslingen, Schreiber; Goss, W. F. M., *Bench-Work in Wood*, Boston, Ginn & Company, 1888; *Handfertigkeitsunterricht an den städtischen Volksschulen*, Strassburg, i. E. (Carpentry); *Handfertigkeitsvorlagen der Leipziger Schülerwerkstatt* (Parts ii., ix., and x., sewed), Leipzig, published by the Editor, 1885 and 1889, to be had of Kantor Zehrfeld;

¹ The Publishers have undertaken to procure any of these works to order.

Kalb, G., *Lehrplan für den Knabenarbeitsunterricht auf dem Lande*, *Blätter für Knabenhandarbeit*, 1891, Nos. 3 and 4; Larrson, Gustaf, *Teacher's Sloyd Manual*, Boston, Alfred Mudge & Son, 1890; Mikkelsen, Aksel, *Dansk Sløjdforenings Modeltegninger*, 2nd edition, Copenhagen; Müller & Füllgraf, *Vorlagen zu Hobelbankarbeiten für Knaben und Erwachsene*, Berlin, J. Harrwitz Nachf, 1889; St. John, *Wood-Work*, London and Edinburgh, William Blackwood & Sons; Salomon, Nordendahl, Johannsen, *Handbok i pedagogisk snikerislöjd*, Stockholm, Beijers Verlag; Salomon, *Ritninger å modeller från Nüüs Slöjdseminarium*; Sickels, Ivin, *Exercises in Wood-Working*, New York, D. Appleton & Company, 1890; Sweevelt, Charles van, *Le Travail du Bois*, Saint-Gilles, Bruxelles, published by the Author, 1889; Urban, Josef, *Die Knabenhandarbeit*, a methodically arranged collection of Designs for Simple Wood-Work, Vienna, Karl Gräser, 1889.

Tools.

Comparatively speaking, of all outfits for manual work, that of the bench workshop is the most expensive. In return this work affords the boy the best opportunity of exerting all his physical strength, and of becoming acquainted with a great number of tools. We give a list of the cost of an ample outfit for a bench workshop. At the outset, the purchase of at least several of the tools, of which more than one, or of which different makes are named, may be deferred.

TOOLS REQUIRED FOR THE OUTFIT OF A CARPENTRY WORKSHOP.

For fifteen pupils.

	s.	d.
One jack plane, large,	1	9
One smoothing plane,	2	3

	s.	d.
Three mortise chisels with handles, 6 mm., 8mm., 10 mm., set,	4	0
Six marking gauges, at 1s.,	6	0
Three sets, three pieces each, wooden squares, at 10d.,	2	6
Six wooden squares, medium, at 4½d.,	2	3
One set bevel,	0	6
One wooden bevel, adjustable,	1	3
One large hand-saw, blade 85 cm. long,	3	0
Three ripping-saws, 70 cm. length of blade, at 2s. 6d.,	7	6
One tenon saw, 55 cm. length of blade,	3	0
Six hand-saws with dolphin handles, blade 45 and 50 cm., for pupils, at 2s.,	12	0
One bow-saw, blade 55 cm.,	1	10
One bow-saw, blade 55 cm., adjustable,	2	3
One dovetail saw, blade 24 cm.,	3	0
One compass saw,	0	9
One notching saw,	1	0
One veneer saw,	1	8
One groove saw,	1	8
One groove saw, adjustable,	3	9
One saw set,	1	0
One pair setting-tongs,	2	0
One mitre box with brass mounting,	5	0
Five plain shooting boards, at 2s. 3d.,	11	3
One block for square shooting,	8	6
One combination box, for square and mitre shoot- ing, with plane,	25	0
Two braces, at 1s. 6d.,	3	0
One set (one dozen) assorted centrebits, from 5 to 26 mm.,	3	0
Six centrebits, 8 mm., 13 mm., 18 mm.,	1	6
One set (one dozen) of plank bits, 2 to 8 mm. (two of each),	3	0

	<i>s.</i>	<i>d.</i>
One countersink-drill,	0	6
One screw-driver, large,	0	8
Four do., small, at 6d.,	2	0
Ten brad awls, at 3d.,	2	6
Two nail-drivers, at 4d.,	0	8
Eight hammers, at 1s. 3d.,	10	0
Two do., small, at 10d.,	1	8
Five mallets, at 1s. 2d.,	5	10
Three draw-knives, at 6d.,	1	6
One draw-knife steel, with handle,	0	10
Two pairs of pincers, at 1s.,	2	0
Eight half-metre rulers, at 4d.,	2	8
One knife, with long handle,	1	3
One do., short handle,	0	9
Eight half-round files, with handles, at 9d.,	6	0
Eight do. rasps, do., at 9d.,	6	0
Eight flat files, with handles, at 10d.,	6	8
Eight do. rasps, do., at 10d.,	6	8
One metal file, with handle,	0	8
One round wood file, with handle,	0	8
Two triangular saw files, with handles, at 5d.,	0	10
Two file brushes, at 6d.,	1	0
Two pairs of steel compasses, at 1s. 6d.,	3	0
Six fret-saw frames with patent springs, at 1s.,	6	0
One dozen fret-saw blades, strong, set and filed,	0	10½
One cutting-board,	0	8
One strong hand drill with six bits,	1	0
One large grinding-stone, complete with wooden trough, with American fixtures and treadle,	21	0
One French sharpening stone,	1	0
One Washita or Arkansas stone,	1	0
One box for same,	0	6
One glue-pot, 2s. 1d. to 3s. 6d.		
Two glue-brushes, one at 3d., one at 6d.,	0	9
One wire-cutter,	0	9
One bench brush,	0	6



Fig. 20. Mikkelsen's Bench System.

[American plane frames are now sold with sets of beading tools, moulding tools, plough bits, etc., and are much used. Sloyd benches can be obtained from 20s. upwards.]

Regarding the nature of the various tools and their handling, see A. Zehrfeld in the *Bericht, etc.*, for 1880. The chief item of expense is the bench itself. Attempts have accordingly been made so to alter the arrangement of the workshop that the benches shall together compose a complete system with a common under-frame. This has been achieved by Aksel Mikkelsen in Copenhagen, whose method we illustrate by the annexed diagram (Fig. 20, page 136). In Germany the Mikkelsen system has been further developed in Loof's combined bench, and an attempt has been made to introduce it (Fig. 21, see below).

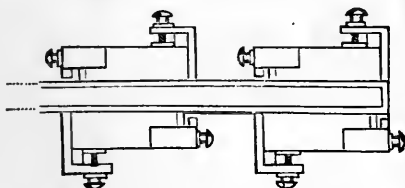


Fig. 21. Loof's Combined Bench.

It remains to be seen whether the execution of the idea will prove practical. The points in its favour are the reduction of the cost necessary for the outfit, and the possibility given to the teacher to overlook the work of the scholars from the head of the bench. It, however, seems doubtful if the combined bench can ever be made so firm that the shaking caused by one pupil will not hinder the accurate working of the others. The row of boys who turn their backs to the window, will, in most cases, stand in their own light. The latter objection would fall through in the case of workshops with windows on both sides of their length. In regard to the bench system, the question again arises between the promoters of individual and class instruction. The Mikkelsen bench is well suited for class instruction. Advocates of individual teaching will give preference to the single bench. Experience only can decide such a point.

The bench is in reality nothing but an apparatus to hold firmly the piece of wood which is to be manipulated, while the hands are left free to use the tools. The so-called parallel bench-vice (shown in the diagram, Fig. 22¹) has therefore been introduced with success, especially for the simpler kinds of wood-work, for the work of the preparatory grade, and as a supplement to the bench. Its construction is very simple. With the screw *a* it can be

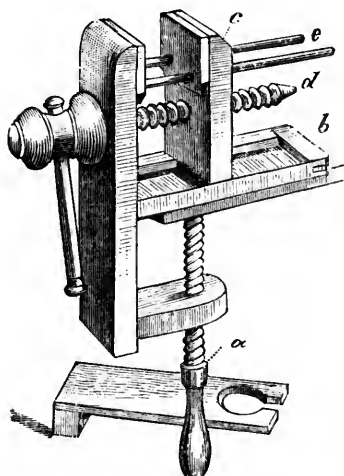


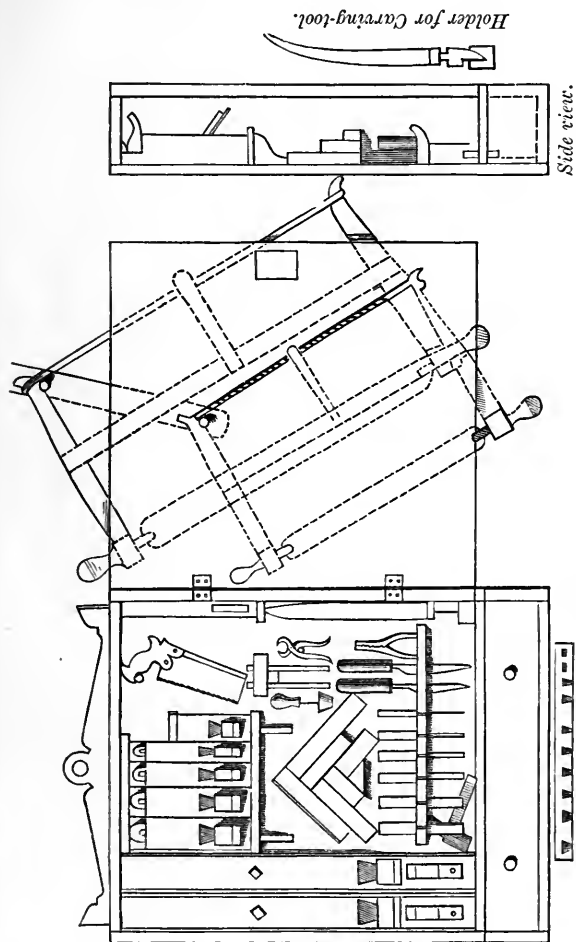
Fig. 22. Parallel Bench-Vice.

fastened to any table or carpenter's bench; by the other screw *d*, and by the guiding rods *e*, the back cheek is moved to and fro parallel to the front one, which remains fixed. Such a bench-vice is very useful in filing and boring, or for short cuts with the saw, and renders cutting-boards superfluous. These latter can easily be replaced by a piece of wood with a circular cutting at one end and a block nailed to the other (as the diagram shows), the block being

fastened between the cheeks of the vice. The price of a parallel vice (eight shillings) recommends it especially where wood-work is to be done by younger boys, and where there are not many benches at the disposal of the workers.

The tool cupboard, which can easily be made to lock securely, serves to keep the tools in necessary order. A

¹ See *Blätter für Knabenhandarbeit*, 1891, No. 7, sketch by E. Schöpss.



Chisel-frame—seen from above.

Fig. 23. Tool Cupboard for Bench-Work.
Tool-frame for the tools necessary for each pupil.

difference should be made between the cupboard for such tools as must always be ready at hand for every one, and the one which contains the tools lent to each worker for his personal use, for which he is responsible. The arrangement of the tools will be best seen in Fig. 23.¹ Besides this



Fig. 24. Tool Cupboard for Bench-Work.
Tool-frame for tools used by all pupils.

there is a frame or case for such tools as are seldom used, of which one specimen only is procured. The sketch by E. Schöpss (Fig. 24) may serve to represent such a case.

The tools for the wood-work adapted to country life are much plainer and cheaper, for here we have only to deal

¹ See *Blätter für Knabenhandarbeit*, 1890, No. 7, article communicated by L. Seidel.

with the knife, or the so-called whittling blade, the notcher or cooper's knife, the plane, the saw, a few gimlets, files, and other tools to be found in every household. Above all, we must have the cooper's bench, as used by wheelwrights, coopers, and the peasants in many parts of Germany. The cooper's bench enables us to hold the piece of wood worked upon fast with the foot, while both hands guide the whittling blade towards the work. The cutting edge of the whittling blade has here the same effect as the blade of the plane. For country work, the coarse cut of the knife is usually sufficient; but in finer work the surface is afterwards smoothed with the plane.

The price of a cooper's bench is ten or eleven shillings, of a good cooper's knife three shillings, of a scraper one shilling, and a set of appropriate brad awls of 10, 15, 25, and 30 mm. breadth, may be had for one shilling and fourpence. The saws, planes, and files required are so cheap that every country school workshop can afford the outlay. If such a workshop is able to add one or two benches for the more complicated work of advanced pupils, they will be a welcome complement of the ordinary apparatus, but are not absolutely necessary. Sawing, planing, chiselling, cutting, and filing can be done at a common work-table, which can be also used for instruction in cardboard-work and carving. (See diagram, pages 181 and 183, Figs. 66 and 67.) Besides a work-table and a suitable number of cooper's benches, the following tools would be needed for the complete outfit of a country school workshop: whittling blade, gimlet, brace with bits, hammer, pliers, pincers, chisel, hatchet, hand-saw, chopping block, saw-horse, grinding-stone, French sharpening stone, file, foot-rule and wooden squares, sandpaper, different nails and brads.

Grinding.—A piece of work generally much disliked and yet one which is absolutely necessary is the grinding of tools. It is not only extremely toilsome to work with a blunt tool, but it is also quite impossible to produce neat

and perfect work therewith. The assistance of a skilful artisan cannot be dispensed with, especially in setting an edge on a tool, nevertheless at least the older boys ought to be taught to keep their tools sharp. They succeed well enough in sharpening the knives for cardboard-work, and the carving tool for wood-carving, but grinding, especially of the plane irons, is more difficult. A hint may be of service. A boy should always hold the iron he is sharpening in one direction. Younger boys, and those who are just beginning wood-work, must not be allowed to grind, and the first attempts even of older and more advanced boys must be made in the presence of the teacher. A full account of all the circumstances which have to be taken into consideration when grinding and sharpening the cutting tools has been given by Schöpss in *Blätter für Knabenhandarbeit*, 1891, No. 8. But, as we said before, a mere description is not sufficient; practical instruction is indispensable. The work must be done before the pupil that he may imitate it properly.

Materials for Work.

It is difficult to give rules which shall hold good universally, as to the wood to be used for our work. Local circumstances greatly influence such details. When buying wood for the school workshop, it is generally advisable to choose boards as free from knots as possible, so that the pupils may be spared many unconquerable difficulties. Soft wood, such as pine wood, fir, red pine, and Scotch fir, is mostly used. The wood of the fir is white and soft; it gives a smooth surface, and has little resin. It therefore suffers more from dampness. It is also light, but not firm when cut with the grain. The red pine furnishes wood useful for our purposes. It is so resinous that resin-ducts have often to be scraped out and filled up, and these interfere with the work. The planing of pine wood is rendered difficult by

its hard knots. They can be made softer by moistening them a little before planing.

The Scotch fir, the Bavarian, the Swedish and the Polish pine furnish the best wood of this kind. All pine wood is saturated with resin, and therefore very durable.

Of hard wood the fine, fibrous alder wood is used. It is somewhat hard, but not too difficult to work with. Objects made of it are neat and smooth, and there is no difficulty in staining them.

The maple tree provides us with a white, hard wood, which is in great demand for fret-work; boards 5 or 6 mm. thick are those most used.

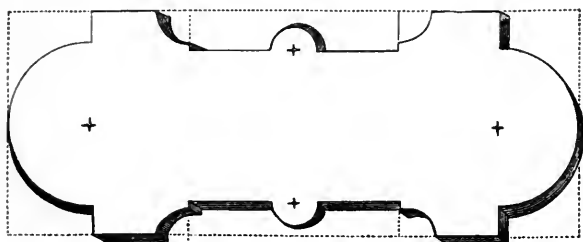


Fig. 25. Bench-Work from the Leipsic Course.
Key-holder.

For country wood-work, the material has to be taken as it grows, indeed the pupils themselves may furnish the greater part of the material. Really good agriculturists do not plant only fruit and forest trees, but others also, such as willows, alder-trees, ash-trees, elms, etc., because they furnish much useful wood for husbandry. Different sorts of wood are required for different kinds of work, such as hedge-pales, stakes, logs, etc. The scholar thus becomes not only instructed in the making of objects, and in the use of tools, but also acquainted through practical experience with the different species of wood and their properties.

Glue.—It is best to use Cologne glue, which is brought to market in opaque yellow cakes. The glue is boiled either

in an iron pot enamelled inside, which hangs in a water bath, or in an apparatus of white sheet-iron. The latter

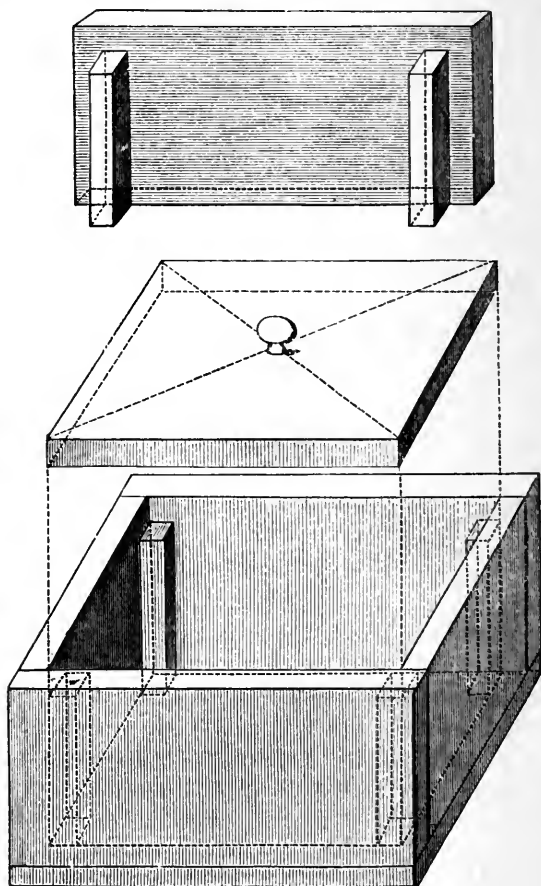


Fig. 26. Carpentry Work.
Sides. Box with loose lid.

arrangement has also two vessels, one within another, the inner being for glue, the outer for water. The use of the

water vessel is to prevent the glue from burning. The bottom of the inner pot should be made of zinc-plate, that

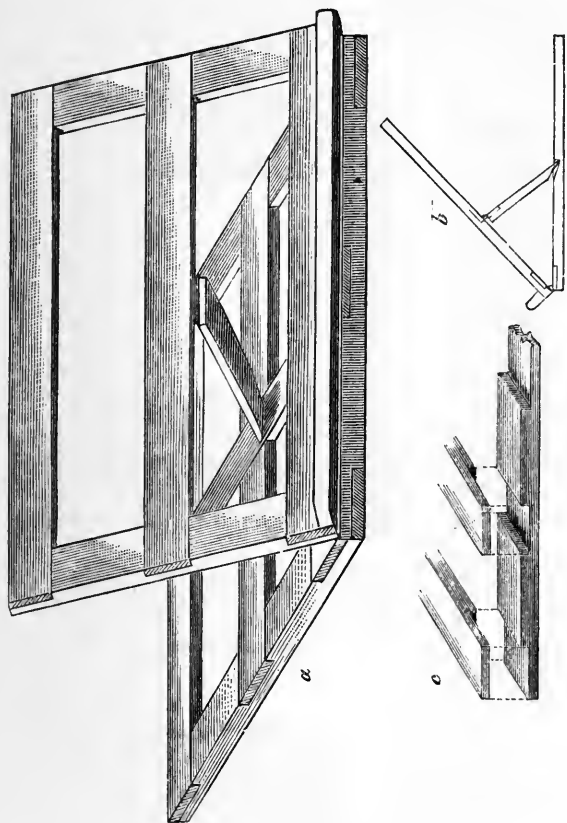


Fig. 27.

it may not grow rusty through coming into contact with the water.

Course of Carpentry Work.

Courses of wood-work for boys have been described in the following works, named page 131: Bruhns, *Die Schulwerkstätte*; Gelbe, *Der Handfertigkeitsunterricht*; *Handarbeitsunterricht an den städtischen Volksschulen*, Strassburg in E.,

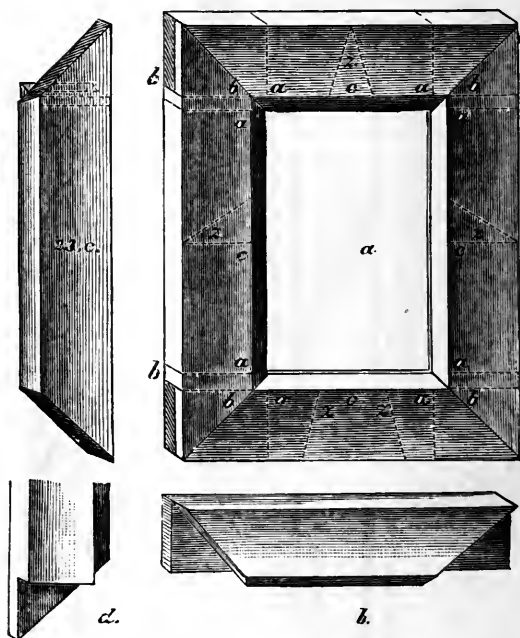


Fig. 28. Carpentry Work.
Picture frame.

Schreinerkursus; *Handfertigkeitsvorlagen der Leipziger Schülerwerkstatt*; Kalb, *Lehrplan für den Knabenhandarbeitsunterricht auf dem Lande*; Mikkelsen, *Modeltegninger*; Müller & Füllgraf, *Vorlagen für Hobelbankarbeiten*, in the Report on the First Years of Manual Instruction at Osnabrück, Osnabrück, 1891 Salomon, *Ritningar å modeller från Nääs*

Elementary Course, Serie för Folkskolor i Städer; Urban, *Die Knabenhandarbeit*.

Courses in wood-work for teachers are given in the following works: *Bericht, etc.*, for 1889; Salomon, *Ritningar å modeller från Nüäs*, Teachers' Course; *Vorlagen für den 7^{ten} Schweizerischen Lehrerbildungskursus für Arbeitsunterricht*, arranged by Rudin, Magnin, and Barbier.

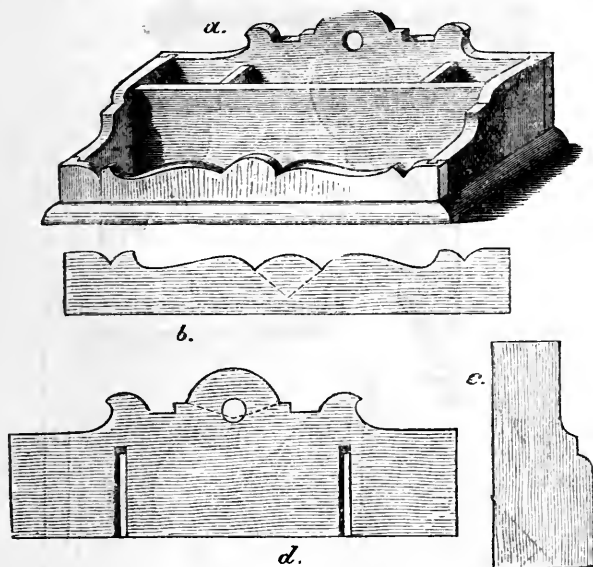


Fig. 29. Carpentry Work.
Inkstand.

Wood-work is the best organised branch of manual work besides cardboard-work. The Northern countries devote themselves chiefly to wood Slöjd, and cultivate it with great zeal. The impulse coming from the North found in Germany a fertile soil, because carpentry calls for vigorous physical exercise, and affords just the compensating activity most needed by our young people, whose intellectual powers are tasked to the utmost.

It would be impossible to comprise within the compass of this book the exceedingly rich and varied material which lies before us in the above-mentioned courses for carpentry. Nor can we dwell on the various suggestions as to method they contain, excellent as these suggestions for the most

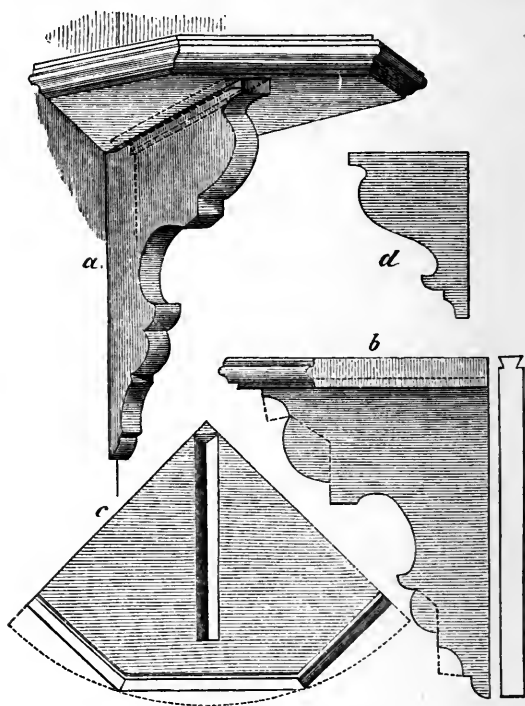


Fig. 30. Carpentry Work.
Corner bracket with curved support.

part are. Without wishing to disparage the courses of Nääs or Berlin, of Osnabrück, Strassburg, Vienna, or Copenhagen, by laying claim to any preference for our own, I take the liberty of giving specimens of the tasks set in the Leipzig school workshop for boys.

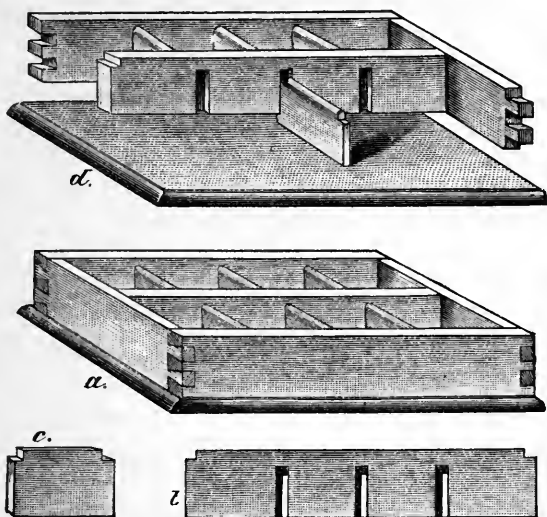


Fig. 31. Carpentry Work. Chest with partitions.

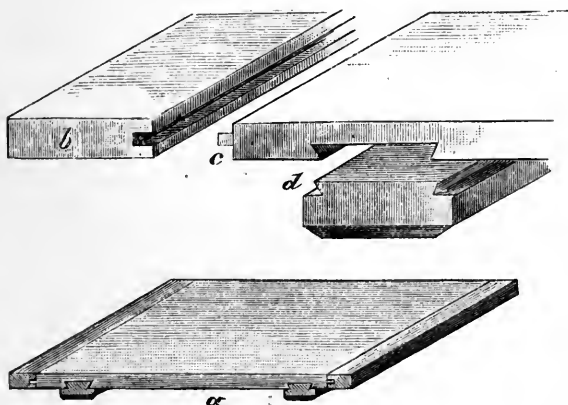


Fig. 32. Carpentry Work. Drawing-board.

For that purpose I select the key-holder (Fig. 25, page 143) and the box with loose lid (Fig. 26, page 144) from the lower grade. From the intermediate grade, I take the reading desk (Fig. 27, page 145) and the picture-frame (Fig. 28, page 146) as exercises in lap-jointing; whilst I give the inkstand as a specimen of joining by groove and tongue (Fig. 29, page 147), and the corner consol with curved support as a sample of bevelled groove and tongue joining (Fig. 30,

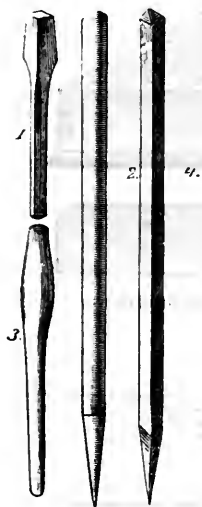


Fig. 33.

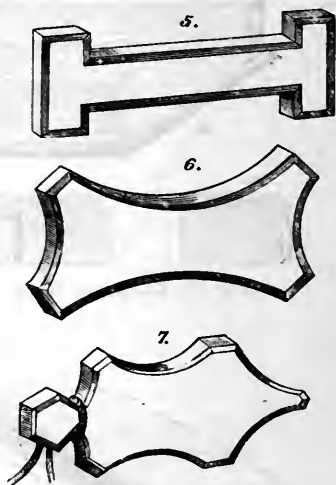


Fig. 34.

Country Wood-Work.

page 148). Of the more complicated work of the upper grade, the chest with partitions (dovetailing) may serve as a specimen, as well as the drawing-board, cleats joined by groove and tongue, rests dovetailed in (Figs. 31 and 32, page 149).

As specimens of wood-work suitable for village life, done with the knife and at the cooper's bench, the following objects are named (Figs. 33-41): (1) Rake tooth. (2) Round flower-stick. (3) Handle. (4) Quadrangular plant-stick.

(5) Spool for yarn. (6) Ribbon winder. (7) Key label. The objects 1-7 are to be made with the knife. (8) Tree prop; (9) Stake for roses. (10) Clothes prop—to be worked

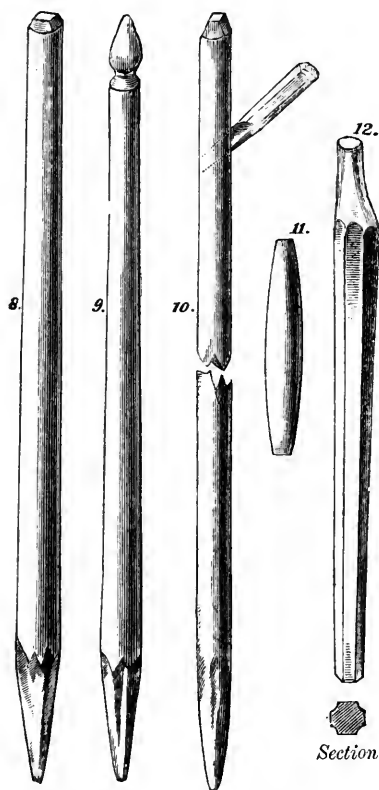


Fig. 35. Country Wood-Work.

from the middle towards both sides symmetrically. (11) Rung of ladder. First wood joint. (12) Leg of bench. (13) Spigot. (14) Flower label. (15) Sheaf-tightener. (Hard wood; the implement must be carefully smoothed.)

(16) Planting stick. (17) Handle of a shovel. (18) Handle of a spade. (19) Carriage bar. (20) Wedge. (21) Handle of a hammer. (22) Handle of an axe. (23) Harness peg. (24) Barred gate. (25) Ladder. (26) Saw-horse. (27) Milk-ing stool.

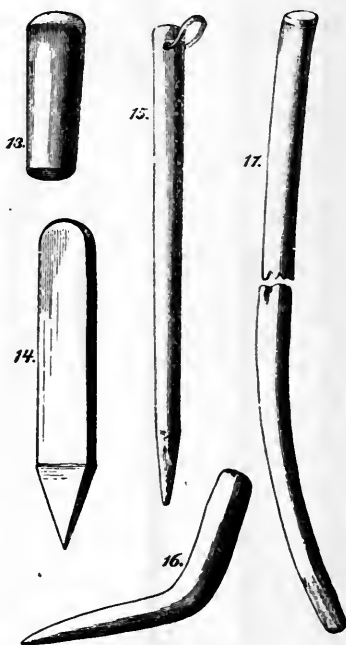


Fig. 36. Wood-Work for Country Use.

D. WOOD-CARVING.

LITERATURE: ¹ Björlin, *Träsnideri-Mönster* (6 plates), Joh. Hellsten, Arkitektur-Bokhandel, Stockholm; Bruhns, *Die Schulwerkstätte*, Wien, Alfred Hölder, 1886 (Kap. iv.,

¹ The Publishers have undertaken to supply these books to order.

Holzschnitzerei); *Trüsnideri-Mönster*, published by Swen Dymling & Co. Göteborg (plates 1-10); Füllgraf & Wackerow, *Der Kerbschnitt*, Polytechnische Buchhandlung, A. Seydel, Berlin; C. Grunow, *Kerbschnittvorlagen*, Leipzig,

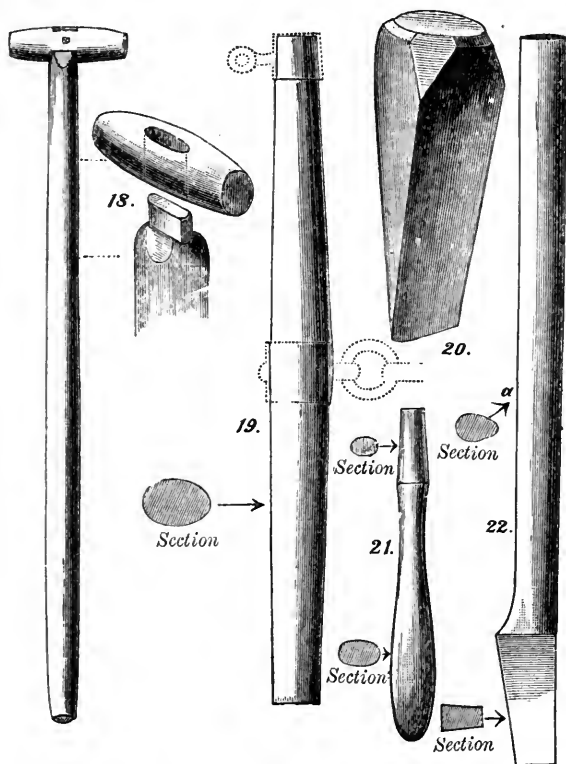


Fig. 37. Country Wood-Work.

E. A. Seemann, 1884; C. Grunow, *Über Kerbschnitt*, *Bericht, etc.*, Leipzig, Hinrichs, 1891; J. Koch, *Der Kerbschnitt*, Karlsruhe, A. Bielefeld, 1890; Emil Kühne, *Über Werkzeuge, Material und Lehrgang der Kerbschnitzerei für*

Knaben, Bericht, etc., for 1890, Leipzig, Hinrichs, 1891 ; C. Lampe, *Kerbschnittvorlagen der Lübecker Schülerwerkstatt* (sheets 1-14), Altona, Anton Send, 1891 ; O. Rosendahl Langballe, *Arbedstegninger til Bohave i. Almuestil*, N. C. Rom, Kopenhagen ; *Handfertigkeitsvorlagen der Leipziger Schülerwerkstatt*, Part iii., Wood-carving ; Part vi., xi., and xii.,

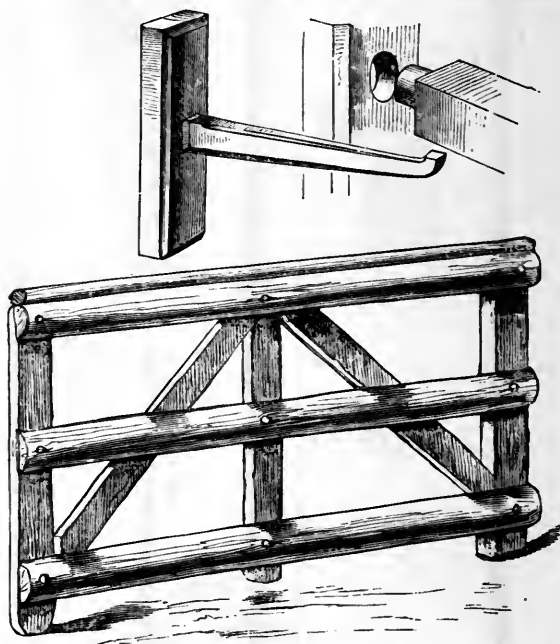


Fig. 38. Country Wood-Work.

Patterns for Chip-carving, i., ii., iii. ; Part xiii., Elementary Course of Chip-carving, 1885-91, O. Neumann & Co., London ; Neumann, *Lehrgang für den Kerbschnitt*, 2nd edition, Leipzig, 1890 ; K. E. Palmgren, *Mönster för Arbetsskolor och Hemslöjd*, Stockholm ; Clara Roth, *Neue Kerbschnittmuster* (plates 1-40), Leipzig, E. A. Seemann, 1890 ; Clara Roth,

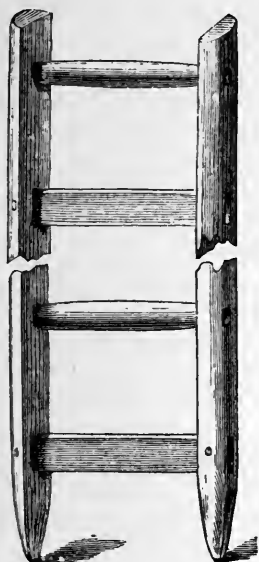


Fig. 39.

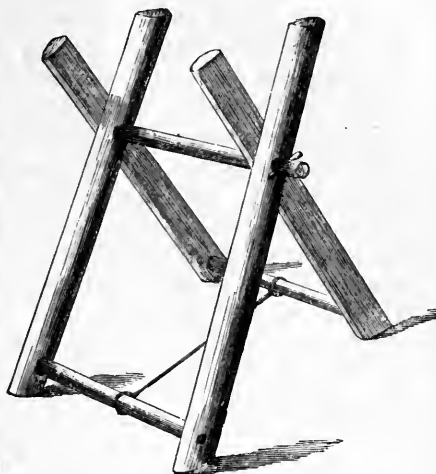


Fig. 40.

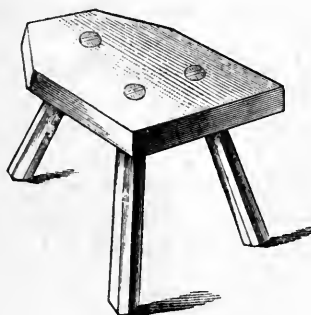


Fig. 41.

Country Wood-Work

Anleitung zur Kerbschnitzerei, Leipzig, E. A. Seemann, 1890; N. C. Rom, *Practisches Hausbuch für alle Freunde der Handarbeit* (2 parts), Leipzig, Peter Hobbing, 1890; N. C. Rom, *Om Almue-Udsküring*, Kjöbenhavn, N. C. Roms Forlagsforretning, 1889; Sauerberg, Kröger, Vollers, *Kerbschnittvorlagen für Werkstattunterricht* (10 plates), Hamburg, 1886; Max Schmiedel, *Der Junge Kerbschnitzer* (20 designs), Leipzig, Otto Spamer; *Vorlagen für den VII. Schweizerischen Lehrerbildungskursus für Arbeitsunterricht*, arranged by Rudin, Magnin, and Barbier; Wood-carving, sheets 1-10; *Handarbeitsunterricht an den städtischen Volksschulen*, 1-7, Strassburg; Paul Sturm, *Lehrgang und Übungsarbeiten der Kerbschnitzerei, Bericht, etc.*, 1890, Leipzig, Hinrichs, 1891; Vollers, *Kerbschnittvorlagen der Hamburg-Hohenfelder Schülerwerkstatt* (new series), 12th sheet, Hamburg, C. Kloss, 1891; Vollers, *Anleitung zur Kerbschnitzerei*, Hamburg, Kloss, 1890.

TOOLS FOR WOOD-CARVING.

Outfit for fifteen pupils.

	s.	d.
Fifteen Addiss' carving tools, oblique, 11 mm. broad, at 9d.,	11	3
Fifteen Addiss' carving tools, straight, 4 mm. broad, at 9d.,	11	3
Fifteen Addiss' carving tools, straight, 8 mm. broad, at 9d.,	11	3
Twenty wrought iron hand-screws, at 1s.,	20	0
Two pairs of French steel compasses, at 1s. 6d.,	3	0
Three wooden try squares, medium, at 4d.,	1	0
One bevel, adjustable,	1	0
One French sharpening stone,	1	0
One Washita or Arkansas stone,	1	0
One box for it, tinned iron plate,	0	6

	s.	d.
Five flat files, with handles, at 8d., . . .	3	4
Five flat rasps, do., do., . . .	3	4
Five half-round files, with handles, at 9d., . . .	3	9
Five do. rasps, do., do., . . .	3	9
One half-metre rule or foot-rule, . . .	0	6
One brad awl with handle, . . .	0	3
One wooden vice, . . .	3	6
One cutting-board, . . .	0	8
One fret-saw frame, . . .	1	0
One dozen of fret-saw blades, set and sharpened, . . .	0	9
One wire cutter, . . .	0	9
One hammer, . . .	1	4
One file brush, . . .	0	8
Two steel dotting-needles at 5d., . . .	0	10
Fifteen pairs of brass compasses for lead pencil, at 1s., . . .	15	0

A moot-point in reference to the tools used in wood-carving is, whether the knife or carving tool should be preferred. The question has been fully discussed from all possible points of view by G. Vollers of Hamburg in the *Blätter für Knabenhandarbeit*, 1891, No. 6. He sums up in favour of the carving tool. On the other hand, the knife is employed, especially in Copenhagen and in Das Rauhe Haus at Hamburg, with a degree of success which deserves recognition. In reality, either is a serviceable tool for those who know how to handle it. The carving tool, however, is recommended by the fact that professional wood-carvers long since adopted it, that by far the larger number of school workshops in Germany have introduced it with good results, and that such authorities as Grunow of Berlin, Koch of Karlsruhe, Sturm of Leipsic, Neumann of Görlitz, and Vollers of Hamburg, give it the preference.

Material and Hints for its Use.

Here, again, no rules of universal validity can be given, because, in the choice of the material, local circumstances, individual taste, and so forth, must be taken into consideration. The wood most commonly selected for carving is alder, lime, or maple. Lime-wood is soft and white, requires a very sharp tool, and therefore is less suitable for beginners. Alder is darker and not so soft, takes a staining mixture well, and is consequently favoured by many workshops. Maple is very white and hard. It is used especially for work which is not meant to be stained. Other good carving woods are pear, apple, box, oak, and walnut.

To preserve the appearance of carvings in white wood, they must be coated with some protecting substance. If they are to remain light, they are covered with varnish, all pencil marks or chance dirt spots having first been removed with indiarubber. But as fine, clean cuts lose much of their delicacy when varnished, staining is usually preferable. For this purpose brown walnut stain is better than ebony black, producing a brighter and more tasteful effect. Walnut stain is prepared by boiling the green shells with soda. The extract is thinned down with water according to need. The shade of colour is ascertained by dipping a shaving into the preparation. Those who are not in a position to obtain the stain in a fluid form, should provide themselves with it in a granular state, and for use, pour 15 grammes of hot water on 1 gramme of the granules. When applied, which must be done with a liberal hand, the stain must not be allowed to dry on one part or a spot will result. Small objects are simply dipped in the solution. As soon as the whole surface is wet, it is wiped with a soft brush. By this means the colouring matter is properly spread, and the superfluous moisture removed. After the work has dried for several hours in the sun or at a stove,

it is, last of all, waxed. The soft wax needed for the purpose is prepared by adding turpentine to melted yellow wax in such quantity as to yield on cooling a mixture that can be readily smeared on a surface. To give the mixture a finer, deeper shade, the turpentine, before use, is poured on alcanna root. The mixed wax is spread over the varnished object with a fine brush. After the work has been left a short time to dry, superfluous wax is removed with the aid of a stiff brush until a faint polish appears on all the cut surfaces. Instead of wax, brunolin may be used.

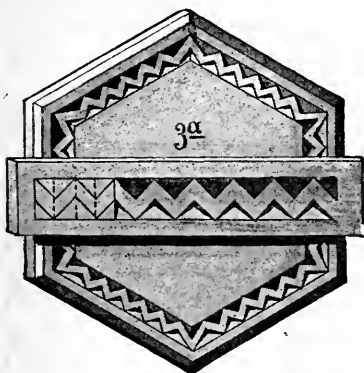


Fig. 42. Chip-Carving from the Leipsic Course.
Exercise and stand.

This also secures the wood against atmospheric influences, and yet leaves the texture distinctly visible. But the polish which brunolin causes is not so fine as that produced by wax.

I may further add that, even before carving, wood may be stained and waxed in the manner described, indeed completely 'finished.' This done, the design is set out with a marking point, and cut into the brown surface. In the same manner polished objects may be carved and good effects obtained. It is, however, well to forego such effects

in the school workshop, because tracing a pattern and carving on a dark ground strain the eyesight.

Another process in wood-carving which we highly recommend is the colouring of single cuts with strong, bright colours. Before being painted, the wood should be coated

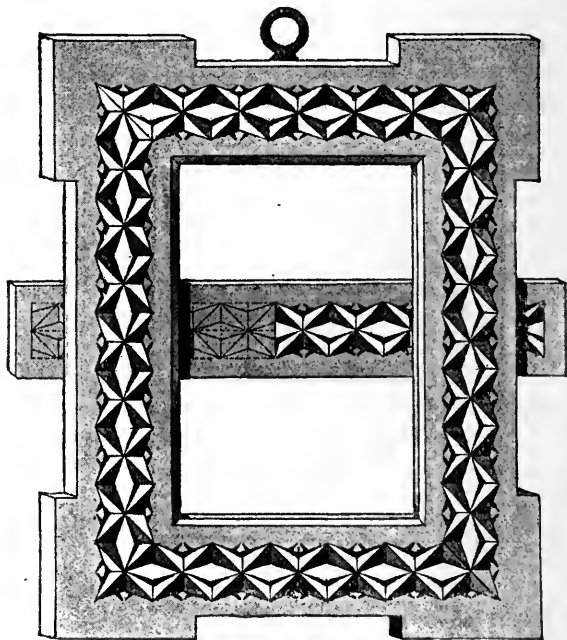


Fig. 43. Chip-Carving.
Exercise and picture frame.

with a thin varnish, to prevent the colours running. After that, any colour—water colour, distemper, or oil colour—can be used. With the latter, even stained surfaces can be covered, but water colours are transparent and cannot hide the stain sufficiently. A few colours only should be used in this method of ornamentation. The best for the purpose

are green, red, blue, and gold. Not all cuts must be painted, only small parts of the pattern, either symmetrically or alternately, as the colour is especially intended to throw the principal *motif* of the design into relief. Gilt lines and dots sparingly applied to the decorations of carvings set them off to great advantage. A mixture of gum and liquid gold may be used for this purpose; great care, however, must be taken not to overload the work with such ornaments, as they are exceedingly apt to make the object look in-artistic and tasteless.

Courses.

Numerous chip-carving patterns have been published. From the Northern countries as well as from Germany we have been abundantly provided with good material for this special branch. We need only mention the works of Director Grunow, *Kerbschnittvorlagen*, and of Prof. Koch, *Der Kerbschnitt*. Systematic courses of wood-carving for boys are less numerous. Besides the Strassburg Vorlagen,

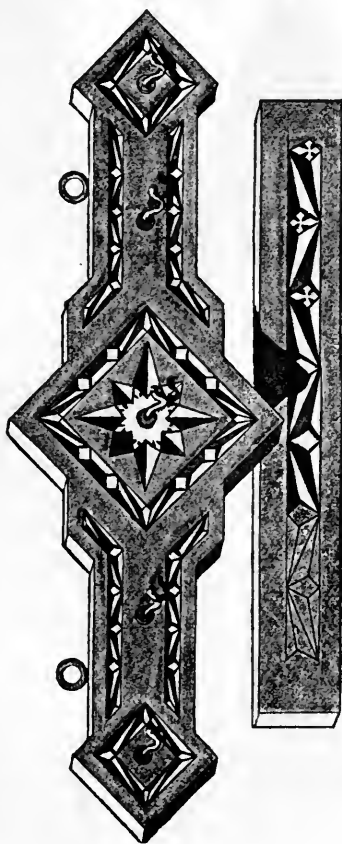


Fig. 44. Chip-Carving. Exercise and key-holder.

we can only name the works of Bruhns of Vienna, Vollers of Hamburg, Neumann of Görlitz, Füllgraf and Wackerow of

Berlin, Sturm and Kühne of Leipsic. We must draw the special attention of the reader to the relation between exercise and application. This branch shows more distinctly than any other the difference between mere exercise in cutting and the application of the acquired skill to objects. We cannot dispense with practice in the different kinds of cuts; on the other hand, the temptation to apply *Technik* to production is nowhere so great as here. Among the above-mentioned courses the Strassburg designs and the work of Füllgraf and Wackerow at Berlin contain nothing but exercises; both reject the making of objects. Bruhns does the same in a great measure. The works of Neumann and Vollers present the exercises separately, and add objects as practical applications of them. The exercises are of course arranged according to the amount of technical skill required. In the Leipsic school workshop we have endeavoured to unite exercise and application in close organic

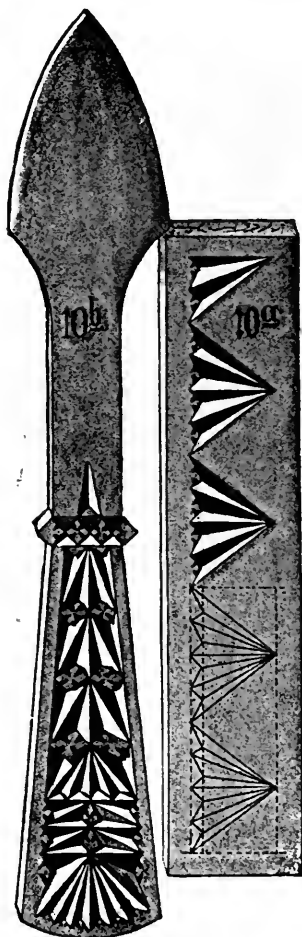


Fig. 45. Chip-Carving.
Exercise and paper knife.

connection. In the course of instruction for boys the cut practised on the board for exercise is immediately followed by its application to simple objects; so that the boy believes

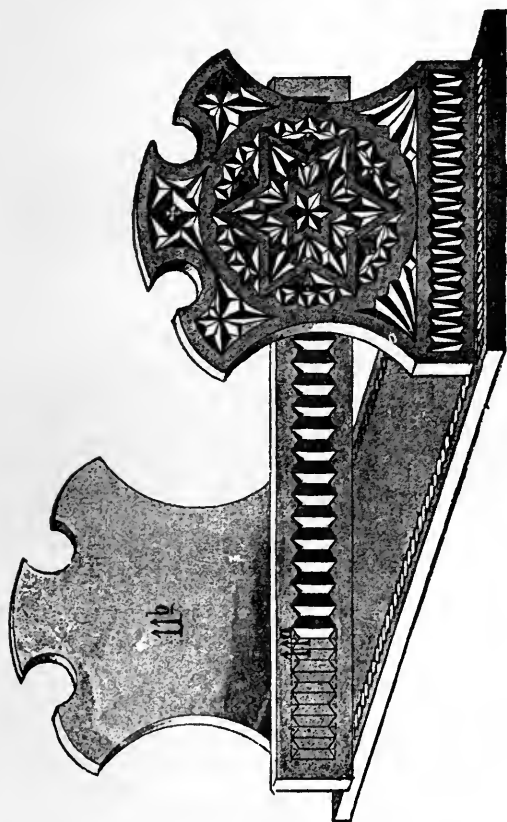


Fig. 46. Chip-Carving.
Exercise and Book Stand.

the former to be the necessary preparation for the latter, and willingly accepts the exercise as part of the bargain. As we cannot dispense with the merely abstract exercise, the connection between practice in it and application imme-

diately following upon it, seems to me most natural and correct. Moreover, if the learner first makes the objects on which his carving tool is to be employed, there is a constant change, of great hygienic value, from one occupation to another. Thus, we have in our Leipsic chip-carving two courses in organic connection, which have a continual influence upon each other, one for the chip-carving itself, where, in due sequence, exercises are made on objects with one,

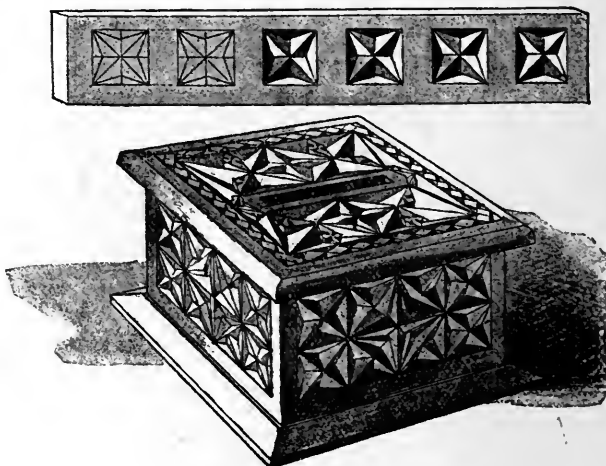


Fig. 47. Chip-Carving.
Exercise and money-box.

two, three, and four faces, and another for technical wood-work in connection with the making of the objects to be carved. In the latter, the rule still holds good of passing from the easy to the difficult, from forms with straight edges to those of freer outline. Simple objects consisting of a smaller or larger surface of wood are succeeded by objects in several parts, joined in different ways. If chip-carving, which in itself cannot be an independent branch of manual training, is to gain ground, this dual course of instruction

cannot be dispensed with. We need hardly add that the boy must do his work for himself, in all its divisions. Not only must the wood he needs have been prepared by him, but he must also draw the design; and the finishing of the work, the joining of the different parts, must be entirely his own achievement. Figs. 42-48 may serve to illustrate some specimens of the course for boys' chip-carving, as it is

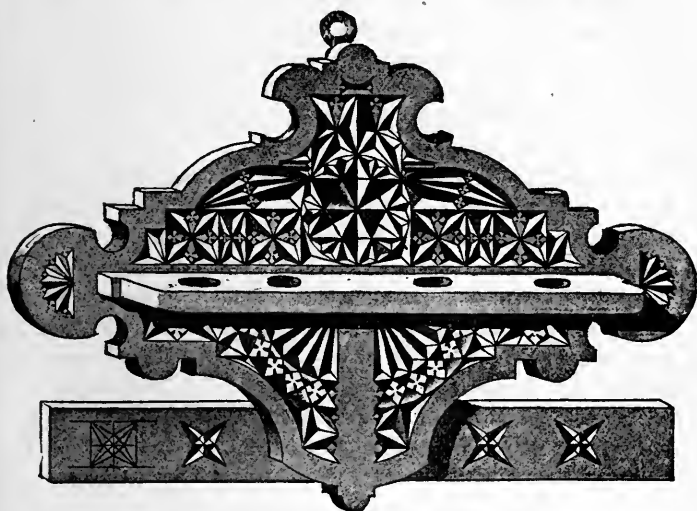


Fig. 48. Chip-Carving.
Exercise and tooth-brush holder.

taught in the Leipsic school workshop. Here, also, practice will always be found to go hand in hand with application.

E. METAL-WORK.

LITERATURE: Breiting, *Lehrgänge der Metallarbeit in der Lehrerbildungsanstalt des Deutschen Vereins für Knabenhandarbeit*, Bericht, etc., for 1891; Bruhns, *Die Schul-*

werkstätte, Chapter ii., Work at the Bench and the Vice; Cranz, Professor H., *Vorlagen für Kleiseisenarbeiten*, J. F. Schreiber, Esslingen, near Stuttgart, 1890; Illing, *Werkstattunterricht in Metallarbeit für Knaben*, Bericht, etc., for 1888, Leipzig, Hinrichs, 1889; *Handfertigkeitsvorlagen der Leipziger Schülerwerkstatt*, Part iv. (sewed); Magnus, *Der praktische Lehrer*, Metal-Work, pp. 21–26; Nitzsche, *Lehrgang der Metallarbeiten*, Bericht, etc., for 1891; Rom, *Praktisches Hausbuch für alle Freunde der Handarbeit*, one chapter on easy metal-work in the first part, and one on metal-work in the second; *Vorlagen für den Handarbeitsunterricht an den städtischen Volksschulen von Strassburg im Elsass*, Locksmith's Course, 3rd sheet.

Nearly all the French books on manual work which have been mentioned in the list of general literature contain articles on metal-work, theoretical and practical. Those amongst them that are written for elementary grades (*i.e.* those by Bertrand, Toussaint and Gombert, Dumont and Philippon, and Planty) treat of folding and wire-work, and combinations of wood and wire. The books for advanced grades (by Daujat and Dumont, and by Laubier and Bougueret) contain tasks for exact filing (*Ajustage*); the former also for forging and metal-turning.

OUTFIT OF TOOLS FOR METAL-WORK

For fifteen scholars.

	s.	d.
Fifteen riveting hammers, at 10d., . . .	12	6
Fifteen pairs of flat pliers, 15 cm., at 8d., . .	10	0
Fifteen do. round do., do., at 9d., . .	11	3
Eight triangular files, with handles, at 5d., .	3	4
Two flat files, with handles, at 10d., . . .	1	8
Two half-round files, with handles, at 1s., . .	2	0
Two pairs plate shears, at 3s.,	6	0
Two steel try squares, finely polished, 27 × 17 cm.,		
2s. 3d.,	4	6

	s.	d.
Two metal scrapers with handles, 12½ cm., at 10d.,	1	8
One steel brad punch,	0	4½
One do. centre punch,	0	6½
One do. cold chisel,	0	9½
One do. seating tool,	0	10
One lead plate for above,	0	6
Two pairs of iron compasses, 15 cm., at 10d., .	1	8
Two do. do., 18 cm., at 1s., .	2	0
Two wooden hammers, large, at 8d., .	1	4
Two do., small, at 5d., .	0	10
One straight soldering iron, strong,	3	9
Three right-angled soldering irons, strong, at 3s. 4d.,	10	0
One hand drill, with brace knob,	4	7
One iron bow saw, with blade,	2	6
One iron hand-vice, 14 cm.,	2	0
Two strong drawing points, at 4½d.,	0	9
Ten half-metre rulers, at 6d.,	5	0
Ten iron vices, about 4½ lbs., at 4s. 6d.,	45	0
One large iron vice,	14	0
One solder blow-pipe, brass,	0	9
One Bunsen burner,	4	6
One soldering box, complete,	9	9

Materials.

Thick and thin brass wire, tinned iron wire, sheet brass, sheet zinc, tinned iron, solder, Baker's mixture, sal ammoniac for cleaning the hot soldering iron.

Courses.

In consequence of the prejudice which, I am sorry to say, metal-work has to encounter in Germany, no great attention has been given there to the arrangement of courses. In

France, England and North America, much more interest is taken in metal-work. But the courses for bent wire-work given in most French books would have to be assigned

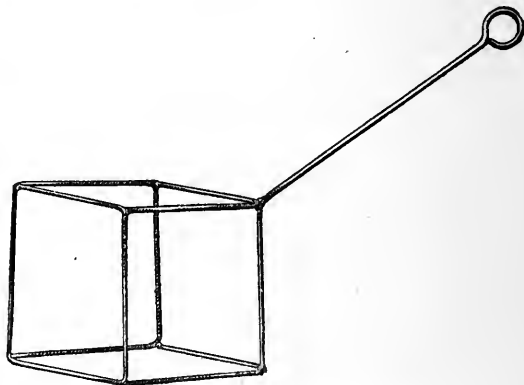


Fig. 49. Metal-Work, Leipsic Course.
Cube and handle.

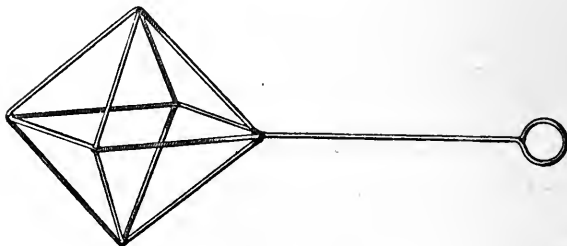


Fig. 50. Metal-Work.
Octahedron.

to our preparatory course for younger boys. The tasks in metal-turning, forging, and filing, on the other hand, are evidently too hard for boys of the age of those who attend our Manual Training classes.

In Germany courses for school workshops proper have only been arranged at Strassburg, by Professor Cranz at



Fig. 51. Metal-Work.
Chain.



Fig. 52. Metal-Work.
Button-hook.

Stuttgart, by Bruhns at Vienna, and by Illing and Nitzsche at Leipsic. The Strassburg Course limits itself wholly to

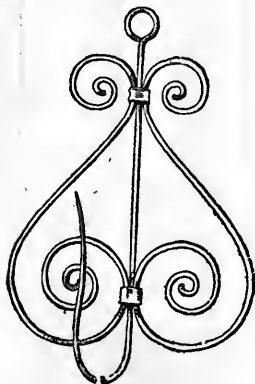


Fig. 53. Metal-Work.
Bill-file.

exercises in filing, excluding, as usual, the making of

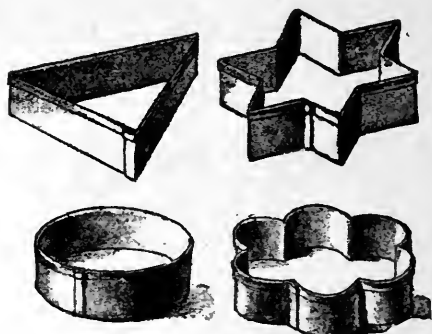


Fig. 54. Metal-Work.
Pastry-shapes.

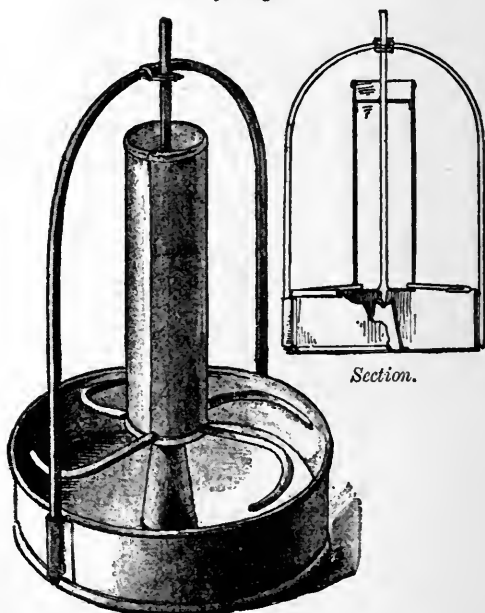


Fig. 55. Metal-Work.
Segner's Waterwheel.

objects of utility. Professor Cranz, in his series of designs for bent iron-work, gives only exercises for folding and twisting thin strips of tinned iron-plate, 5 mm. broad, into various useful articles. Bruhn's course in metal-work, again, is closely connected with the bench-work course, and even dependent on it. In it metal-work is only introduced in order to supplement bench-work in the construction of objects for experimental work in physics. The only metal-work course independent of other subjects is that of the Manual Training school in Leipsic. It is adapted for boys of from eleven to fifteen years of age.

This course seeks to combine the different exercises in wire and plate working, and to apply them to the production of objects of utility.

It begins with bending and soft soldering of thin brass wire (geometrical forms, plane or solid), and goes on to work with tinned iron-wire (bending and soldering without soldering iron, use of the file), soldering with the soldering

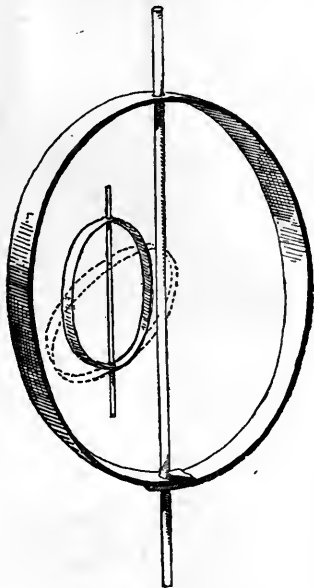


Fig. 56. Metal-Work.
Centrifugal ring.

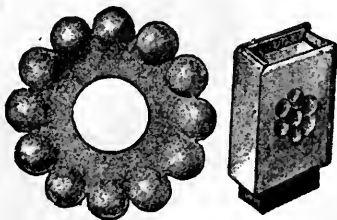


Fig. 57. Metal-Work.
Candle-guard. Matchbox.

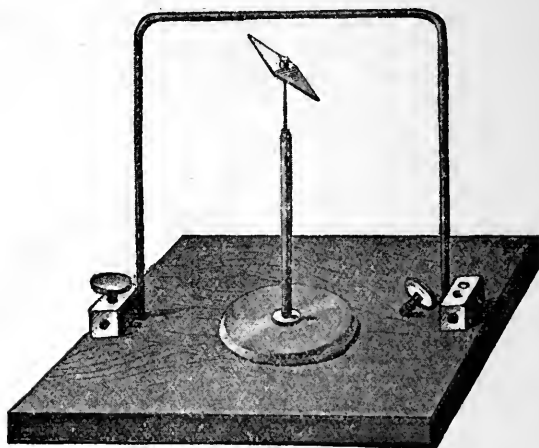


Fig. 58. Metal-Work.
Magnetic needle with stand and holdfast screws.

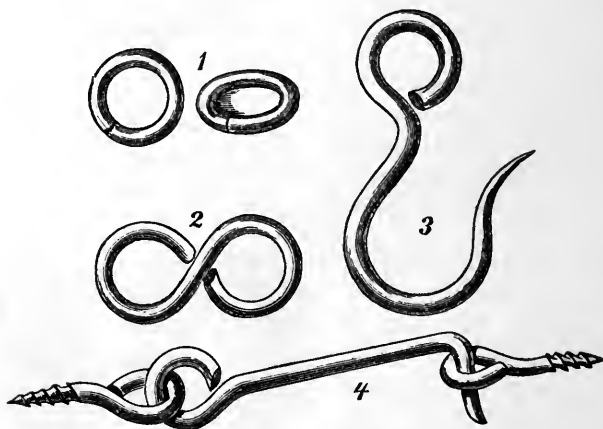


Fig. 59. Country Metal-Work.
1. Wire rings. 2. S-shaped link. 3. Meat-hook. 4. Hook with
two eyes to fasten a door from the inside.

iron, use of hammer and punch, cutting, soldering blunt ends, edging and folding plates. After that follow exercises relating to riveting, drilling, and threading screws.

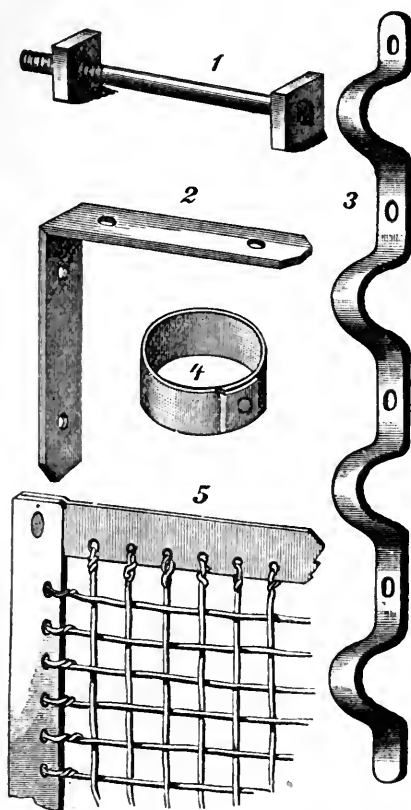


Fig. 60. Country Metal-Work.

1. Screw with knob and nut. 2. Clamp for joining wooden articles.
3. Tool or spoon-holder. 4. Ring to put round wooden poles
or handles. 5. Iron frame with lattice-work.



Fig. 61. Country Metal-Work.
Corner-piece for box.



Fig. 62. Country Metal-Work.
Box with lid.

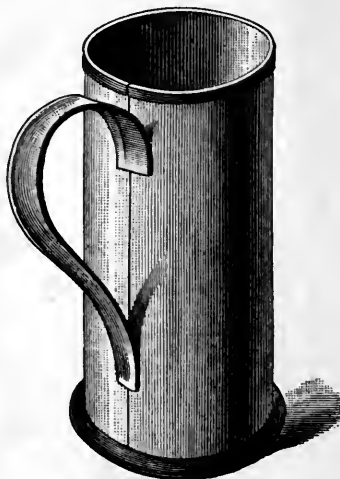


Fig. 63. Country Metal-Work.
Half-litre measure for liquids.

We see then that metal-work offers just as much variety, and may with just as much right be brought into the province of manual work as bench-work and cardboard-

work. Experience also teaches us that it is this very variety that enlists the interest of boys, especially of older ones. Figs. 49-58 represent some of the designs from the

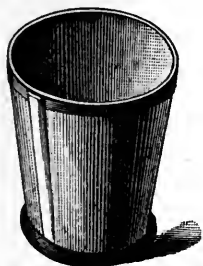


Fig. 64. Country Metal-Work.
Tin cup.

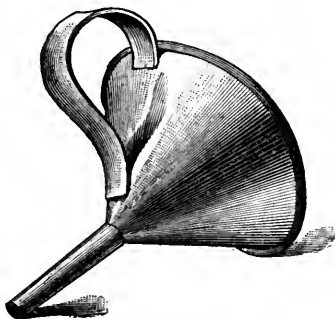


Fig. 65. Country Metal-Work.
Funnel.

Leipsic Course for metal-work, while Figs. 59-65 may serve as specimens of our course in country metal-work.

F. MODELLING : MOULDING IN CLAY OR PLASTILINA.

LITERATURE : Bertrand, Toussaint et Gombert, *Le Travail Manuel à l'École et dans la Famille*, Paris, Lecène, Oudin et Cie., 1890, pp. 173-194 ; Bruhns, *Die Schulwerkstätte*, Vienna, Alfred Hölder, 1886, Chap. v. ; A. Büttner, *Das Formen und Zeichnen im Blindenunterrichte*, Düren, R. Hamel, 1890 ; Dumont and Philippon, *Guide Pratique des Travaux Manuels*, Paris, Ve. P. Larousse & Cie., pp. 145-166 ; Hertel, *Das Formen in der Handfertigkeitsschule, Bericht, etc.*, 1891, Leipzig, Hinrichs, 1892 ; *Aus dem Pädagogischen Universitäts-Seminar zu Jena*, 3rd Part (sewed), Langensalza, Hermann Beyer & Söhne, 1891 ; *Das Formen in Thon and Gips*, pp. 7-19 ; *Handfertigkeitssvorlagen der Leipziger Schülerwerkstatt*, 5th Part, Leipzig, 1885 ; Planty, *Cours de Travail*

Manuel, Paris, Gédalge Jeune, 1888, Elementary Course, Chap. iv., Modelage, and Intermediate Course; Chap. iii., Modelage d'Ornements d'Architecture; George Ricks, *Hand and Eye Training*, London, Paris, and Melbourne, Cassell & Co., 1890, Book I., Chap. ix., Modelling in Clay; Stepman and Calozet, *Le Modelage Scolaire*, Bruxelles, 1891; Theodor Sonntag, *Das Thonformen als Unterrichtszweig in der Schülerwerkstatt*, *Blätter für Knabenhandarbeit*, 1890, No. 8, and 1891, Nos. 5 and 10; *Vorlagen für den Handarbeitsunterricht an den städtischen Volksschulen zu Strassburg i. E.*, Modelling Course, fifth sheet, Strassburg, Schmidt.

The tools required for working in plaster of Paris or gypsum are—a knife, spoon, saucer, and brush; for modelling in clay or plastilina—slates or panes of thick glass to work on, and modelling sticks made of box or olive wood.

Materials.—Plaster of Paris, modelling clay, plastilina, or modelling wax.

Courses.—The opinions of the promoters of Manual Work still differ regarding the course of instruction in modelling. When, more than ten years ago, the method of the workshop had to be arranged, modelling, as it was called, was thoroughly considered. In several workshops practical attempts were made to introduce it. Manual work cannot of course aim at modelling as an art, and the first attempt to organise into a graduated sequence the educational elements of the subject were not well advised, and consequently this branch of Manual Training did not thrive. In the Congress which met at Osnabrück, 1884, the general feeling was adverse to modelling, and hence most school workshops looked askance at it. This verdict, however, was by no means the last word on the subject, which evidently was not at that time ripe for discussion. The idea grew that modelling in plaster must be an excellent discipline for hand and eye, and that (excluding all attempts at amateur art), it offers a key to the understanding of form. This view was confirmed by experience in various school workshops: at Strassburg,

in the Manual Training schools in Vienna under Bruhns (see *Blätter für Knabenhandarbeit*, 1891, No. 2), at Zwickau (see the Ninth Annual Report of that school), at Leipsic, in the *Knabenhort* at Gera and in the *Universitätsseminar* at Jena (*Blätter für Knabenhandarbeit*, 1891, No. 1). Modelling thus gained in importance, especially in the instruction of the blind, who receive, as it were, sight-impressions through the sense of touch. (See Görner, *Manual Training in the Blind School*, *Bericht, etc.*, for 1891, Leipsic, Hinrichs, 1892.) The Schools for the Blind at Dresden and Leipsic have done much towards cultivating the system of modelling as an independent branch of instruction. They have utilised it for teaching natural science, geography, physical geography, and geom try. Indeed, it grows more and more clear that modelling, we conceive it, does not mean a pretentious imitation of art. It is rather such a training of the observation as shall open to the student the world of form in its infinite variety. It is an outcome not of plastic art, but of the drawing lesson, for it is simply drawing in space instead of on a plane.

The existing courses of instruction in modelling, except those in asylums for the blind, are intended as a rule for younger boys. The French works by Bertrand, Toussaint and Gombert, by Dumont and Philippon, and by Planty (*Cours élémentaire*), and the English book by Ricks, treat of modelling for children of six to nine years of age, as also do the works of Hertel and Sonntag. Hence they were mentioned under the preparatory grade. The course prescribed by the pedagogic *Universitätsseminar* at Jena goes hand in hand with the teaching of the history of civilisation for the lowest classes of the *gymnasium* (Egyptian culture, Greek mythology, the period of the Persian wars), and confines itself to illustrating the architecture and simple ornaments of those times (*e.g.* Pyramids, Egyptian columns, Lotos and other capitals; Greek helmets, swords, lances, shields, etc.; triglyphs, Doric capitals, labyrinths, etc.).

The course given by Planty (*Cours moyen*), as also the courses of the Strassburg, Leipsic, and Vienna school workshops, are intended for older boys. In the diagrams of the Leipsic Manual Training school, the modelling course represents the development of a simple languet leaf into the palmetto form. That of Bruhns gives the chief forms of elementary ornament: palmetto, rosette, and acanthus-leaf. The sculptor, Paul Sturm of Leipsic, has recently arranged, but not yet published, a course of modelling based on Fedor Flinzer's theories of drawing instruction. It is evident that this branch of manual work is at present in a very rudimentary stage of development. Perhaps some day it will altogether separate itself from other branches of manual instruction, such as wood, cardboard and metal work, and be joined with school drawing as its natural ally. It is, however, quite logical that this special development of drawing should receive its impetus from the school workshop, which is the champion of every movement for employing the activity of the boy.

G. TOOLS AND WORKSHOPS IN GENERAL.

The question has frequently arisen, whether tools as used by workmen are available for the Manual Training schools, or whether they ought not to undergo some modification to adapt them to the hands of children. As regards the size of the tools, this question must certainly be answered in the affirmative. If good work is to result, the workman must master his tools; so the tool must be suited to the strength and size of the hand that uses it. This follows from the idea of a tool, which, fundamentally, is an artificial development of the hand for specific purposes; it is the application of some hard and durable material to the more efficient discharge of functions originally performed by the hand itself. By putting a locksmith's hammer or a carpenter's saw into the hands of

a boy, we render his work unduly difficult, and exhaust his strength unnecessarily. In spite of all his efforts he fails to master the tool, and bad work results. But as success is a spur to renewed exertions, so undeserved failure discourages the mind and enervates the will. We do not, however, mean that tools should degenerate into mere playthings. A true boy will exert himself to the utmost, and to him, as to others, the earnest exercise of the faculties will bring the fulness of joy; but serious work for a given end should be assisted and not hampered by the tool employed. Above all, we must be careful that, though weight and size be reduced, the quality and finish of the tool remain the same. Consider what importance a competent workman attaches to good implements; they are, as he says, half the battle. Indeed, the reason why work in the home makes so little progress, is to be sought primarily in the fact that successful work is impossible with the common tool-boxes for domestic use, which contain, for the most part, nothing but the cheapest and most worthless goods. It is not true that anything is good enough for boys. The more educational manual work spreads and takes root, the sooner will good makers show themselves ready to supply tools at once serviceable and suited to youthful hands.

The tools must, however, differ from those of the workman, not only in size and weight, but also, to some extent, in kind. In adopting the knife, the parallel bench-vice, etc., for the wood-work of our younger boys, we have already gone beyond the tools of the professed carpenter. Nor do we mean to transplant the crafts, as crafts, into our schools; our desire is to give the boy a general introduction into the world of human work. The knife is not a joiner's tool, yet it is an instrument of general use and various applicability, the handling of which every boy must learn. The parallel bench-vice will not be found in any carpenter's workshop, but it is a very convenient apparatus for holding wood fast whilst being bored, filed, cut, or even planed. And as the

idea of Manual Training is developed, our concern will always be to provide tools fit for boys, even at the risk of deviating from the forms in use amongst craftsmen.

Lastly, it is of great importance that learners should procure for themselves such tools as must be always at hand, such as the knife, scissors, foot-rule, or metre-rule, carving tool, folding-stick, flat-jawed pliers, etc. Their doing so assists in extending the occupations of the workshop into the home.

The chief difficulty met with in introducing Manual Training is, as a rule, the want of space. The question at once suggests itself whether rooms already in use, classrooms, the gymnasium, or the drawing-room, could not be utilised for the purpose. We answer that modelling or moulding may be taught in any drawing-room if due care is taken to keep the room clean; whilst cardboard-work and wood-carving may also, in case of need, be carried on in rooms usually devoted to other subjects. For such an adaptation of rooms, arrangements for good light, tool cupboards, and, most important of all, work-tables, are needed. Dr. Zickerow of Cammin has shown how a schoolroom with desks and forms may easily be changed into a workshop (see No. 1 of the *Blätter für Knabenhandarbeit*, 1891). His method of making desk and form serve as a stand for a work-table, 80 cm. in breadth, can be seen from the sketch (page 181). The connection between the table and the leg which supports it may be made firmer by a close-fitting movable joint. Special rooms are, however, most desirable for instruction in all branches of manual work; for bench-work and metal-work they are essential. Even the use of one workshop for teaching several branches has its difficulties. Our ideal will therefore always be, to have separate workshops for the different subjects, and these well furnished with good tools. In many cases, however, where only limited means are at our disposal, simpler outfits must be made to answer the purpose. The difficulties of teaching

bench-work, wood-carving, and metal-work all in a single room can be overcome by making use of such a work-table as Schöpss proposes in the *Blätter für Knabenhandarbeit*, No. 9, 1890. It consists principally of a thick plank of red beech wood. This has arrangements for holding wood fast, and is fixed like a table to the wall against the window (see Fig. 67, page 183). The length of the table must fill up the whole breadth of the window; its thickness is about 6

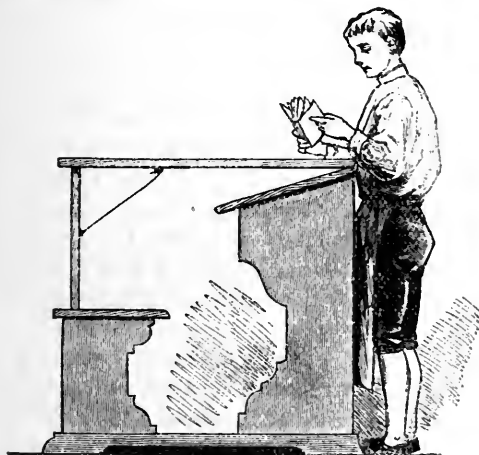


Fig. 66. Transformation of a School-bench and Desk into a Work-table.

cm., and its breadth about 40 cm. In order to gain a greater width, and at the same time to make a sort of tool-tray, a board about 40 cm. breadth of soft wood is screwed underneath the back longitudinal edge with its own back edge against the wall. Cardboard-work can be done on these tables without other fittings; for wood-work a hand-vice is needed. At intervals of about two mtr. holes are bored close to the front edge of the plank, in which the screw of the hand-vice (see Fig. 67, page 183) is inserted when the

vice is in use. For planing, wooden bench-pegs are sunk into the plank at about 15 cm. from the front edge, which are furnished at their upper ends with sharp steel points. The piece of wood to be planed is laid with cross-grain end against the bench-hook. For making an edge the shooting-board is used, which also lies against the bench-pegs, and is held fast by the steel points. If larger surfaces are to be worked on, the holdfast is required, an implement which holds the wood steady to the surface of the table. To keep this holdfast in position there must be two holes to every pupil's place, bored through the tables diagonally to each other. The shape of the holdfast and the manner of using it will be seen from the sketch (Fig. 67, page 183); *a, b, c*, are the points of pressure. The hook is secured by striking it on the head with a mallet, — lateral blows from the right side loosen it. For certain work, however, a carpenter's bench is absolutely necessary, but most kinds of wood-work, such as sawing, chiselling, boring, and planing, may be done perfectly well at such tables, and, of course, wood-carving also.

The furnishing of a workshop for one single branch of work is a much easier matter. In the workshops for card-board-work, wood-carving, and modelling, the important point is to arrange that all the work-tables shall be in a good light. The tools must be kept in frames and cupboards so that they can easily be surveyed, as was shown before when treating of the different branches. In a metal-workshop there must be against the walls beneath the windows stationary benches, or else strongly-made tables with legs firmly screwed to the floor, on which vices may be fixed. In a workshop for bench-work, economy of space and the advantageous disposal of light in the arrangement of the work-places are the chief points needing attention. Otto Salomon, in his book, *Handfertigkeitsschule und Volksschule*, pp. 50–53, gives a more detailed account of one of these bench workshops; and another one, answering all require-

ments, is described in the Report on Manual Instruction at Osnabrück during the years 1881-91. We give a sketch of the Osnabrück *Handfertigkeitshalle*, used for wood-work only, and presented by a promoter of the movement in the

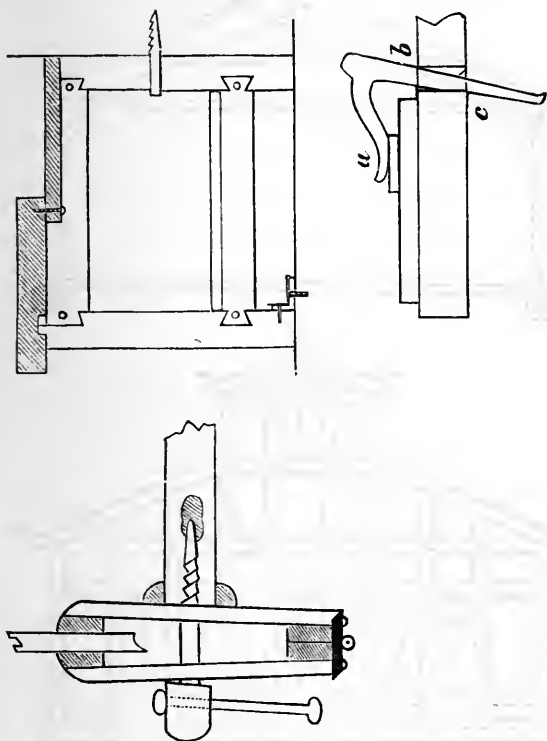


Fig. 67. Hand-vice, Work-table, Holdfast.

town. The Report says that this building has at the east end two vestibules—one for entrance and one for exit, with a model room and a teachers' room between them. The remainder of the space is occupied by one large instruction hall, 10 mtr. broad and 18 mtr. long. The construction of the roof is obvious; light enters from three sides. In the

evening the hall is lighted by ten large petroleum lamps, and there are several smaller lamps for use when needed. The hall is ventilated by means of skylights, which can be

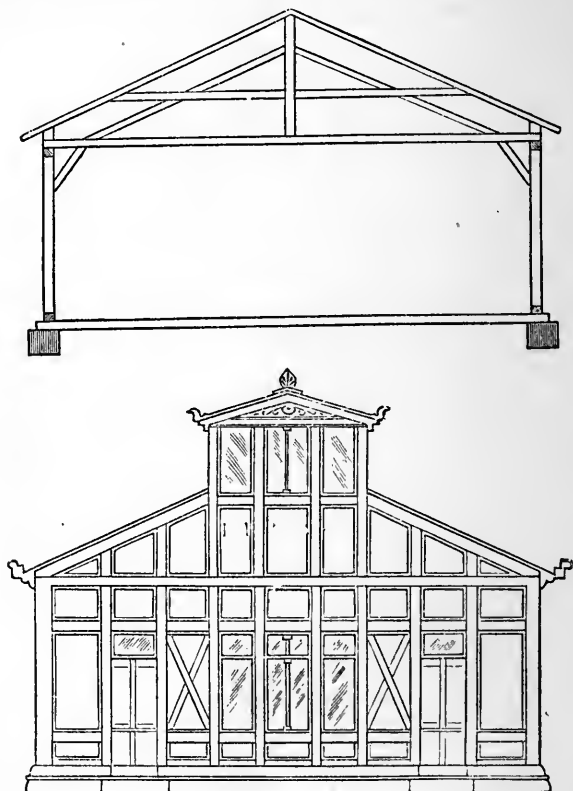
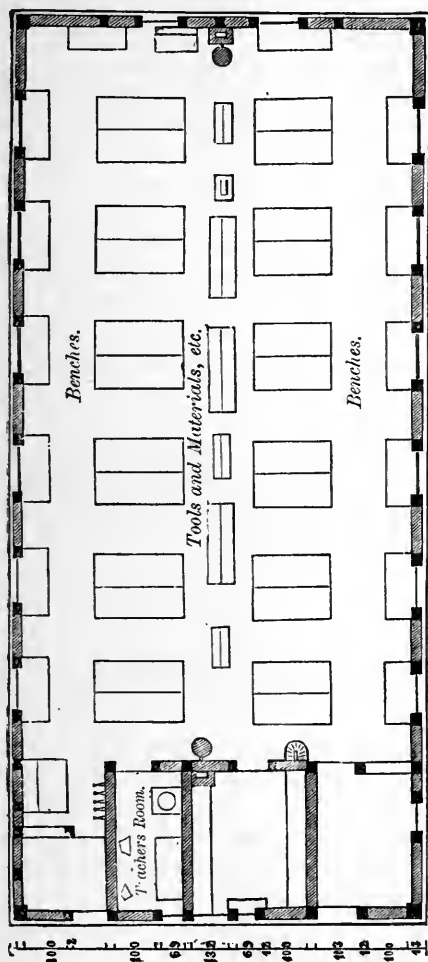


Fig. 68. Osnabrück Workshop. Outside View.

turned horizontally. Stoves are placed at both ends of the hall. The wood is stored on the beams which form the ceilings of the vestibules, within sight and easy reach. Along the side walls, and in the middle of the room, there are



69. Interior of Osnabrück Workshop. Ground Plan.

thirty-eight carpenters' benches. The tools lie on three large stands, so distributed through the room that each pupil can easily reach what he requires; while the finer tools of English steel are kept in a cupboard.

For the fitting up of workshops in school buildings and other educational institutions no general rules can be given, because local circumstances must always be taken into consideration. The easiest way to obtain rooms for workshops is to have an additional building joined to the gymnasium, or another story built upon it. Basements, too, provided they are high, light, airy, and but little below the level of the street,—and such are frequently found in newly-built schools,—may be used as workshops. Should basements be intended for this purpose, when the building is being planned, they should not be arched, but crossed with iron girders; if ventilation is also provided for, they will prove very serviceable workshops. Of course, all the sanitary precautions required in the case of other school buildings must be observed also in the rooms for Manual Training. Light and air are the two essentials.

VIII.

RELATION OF MANUAL TRAINING TO HOME, SCHOOL, AND THE CRAFTS.

So far we have spoken of Manual Work itself; we must now briefly discuss its position towards other closely connected factors.

That the practical employment of our boys stands in intimate relation to domestic life, is established by the fact that in Sweden and Denmark, whence our movement received its first impulse, the source of Slöjd must be looked for in home industry. And by home industry we mean, not the home production of objects for sale, but work done in the home to supply domestic wants, and so to utilise the time

not claimed by daily vocations. Only at a later time, when the friends of home industry saw that their work must begin with the child in its school days, did Slöjd become a means of education. The movement in the North abandoned economic aims, and turned to the pedagogic task of employing manual work in the service of the general education of man.

Indeed, no objection of our opponents seems more incomprehensible than the suggestion that children are estranged from home by being educated to manual work. The end we have in view is the exact opposite of this. We seek to point out to the family the duty of occupying children in a useful manner, to render it effectual assistance in the discharge of that duty, and to revive a love of the occupations of domestic leisure—a love which has unfortunately in so many cases been lost. School workshops do not injure family life, but reanimate it by means of the pleasure which work in the home gives. If the boy has grown to like his work, his carving board and tools for simple cardboard-work will go home with him, and the profitable employment of his leisure is assured. Thus, Manual Training acts directly in the interest of family life. And when a generation has been raised which shall possess more skill of hand than our own, when the dexterity which has been almost destroyed by the wholesale manufacture of cheap wares is restored, then will fathers again be found, who of an evening, when the members of the household gather round the hearth, can give their boys instruction in practical work. There is then, I repeat, no opposition between family life and education in manual work; our sole aim is to prevent the growing up of a generation with blunted senses and awkward hands, disinclined to apprehend and observe, and showing no delight in the exercise of the bodily powers. That is an aim with which the home has no mean concern.

Of the attitude of Manual Training to the crafts we have already spoken in considering the economic reasons for it, and the objections advanced by many artisans. We lay

constant stress on the fact that the crafts have no need to fear our competition, and that there is no question of reducing the term of apprenticeship required by each. Just as drawing is only taught for the sake of general education, so should it be with practical work. Cardboard-work, for instance, has nothing in common with book-binding except that they both accidentally use the same materials, though for entirely different purposes. As long as Manual Training keeps its educational aims steadily in view, there is no ground for any anxiety on the part of the artisan. In removing such difficulties as this, Dr. Justus Brinckmann, Director of the Museum of Industrial Art at Hamburg, rendered good service by his statements before the Conference held there in 1889. His speech is reported in the *Bericht über den IX. Deutschen Kongress für erziehliche Knabenhandarbeit*, pp. 57-63: 'What Interest have Artisans in promoting Manual Training?' The speaker pointed out that by copying good models a boy's taste is directed into the right groove, and he is enabled to carry with him into life an experience which until now the school never so much as attempted to supply. Further, he dwelt on the advantages accruing to the crafts from the cultivation of the boy's hands. 'There are,' he observed, 'many callings—not to mention a whole series of scientific and artistic professions—in which a finely trained hand, obedient to the will, is of the utmost importance. All vocations are sure to benefit if the boy is schooled in his early years to make his hand a perfect instrument of his will; but most of all will the industrial callings gain. Accustomed to industrial employments by approaching them of their own free will, our boys will inevitably be led to reflect upon their own future professions. They will cease to choose careers at random, to find themselves afterwards discontented therein. In wide circles of our rising generation interest will be awakened for those industrial vocations which are now too commonly despised.'

When a leader of artistic and industrial training expresses

such ideas, it is not surprising that elsewhere men in similar positions, as Eitelberger in Vienna, Grunow in Berlin, Luthmer in Frankfort-on-Main, and Zur Strassen in Leipsic, show warm sympathy with the idea of educational Manual Training for boys. We also understand why well-known and first-rate authorities in the industrial world have by their assistance helped our school workshops (as, for instance, those at Osnabrück, Dresden, Berlin, Munich, and Leipsic) with very satisfactory results. They recognise with a free and unprejudiced mind that the idea of a general foundation for the crafts, based upon the training of the eye and hand, can but assist them. However insignificant this general preparatory training may be, it ought not to be underestimated by German artisans. It is an incontrovertible fact that in France, where, in 1882, such instruction was introduced by law, about twenty thousand schools have compulsory Manual Training. It would not be prudent if we in Germany were to close our eyes to such things. In spite of all prevailing prejudices, it is still to be hoped that the similar efforts being made in our native land may not fail in their purpose, and come once more to nought for want of appreciation and understanding.

The relations between the school workshop and the school proper have also already been discussed. Speaking of the objections to our system raised by teachers, and of the tasks to be selected—tasks in connection with school instruction—we protested that we did not claim the obligatory introduction of Manual Training into the schools of the present day. And indeed a cry for compulsion would endanger all that we have hitherto so laboriously achieved. It must be admitted our schools have no room for a new subject. Even if they had, Manual Training still lacks the necessary elaboration of all its parts. We do not mean that the questions still pending will not in time be solved; on the contrary, we confidently expect the solution of them. Nor must it be supposed that a gradual transformation of the present

'learning school,' into one which takes the child's impulse towards activity more into account, is altogether excluded. The German school system has made enormous progress since its beginning. Are we to believe that its development has been finally checked? Nay, I would even express my conviction that as the school changes from a place of instruction to a home of education, so will the dogmatic verbal teaching which condemns the child to be a mere passive recipient, lose ground in favour of a method which forms the intellect by utilising the activity of the child. And the simplest activity, the results of which are manifest even to the child itself, is practical work. But such work must not merely serve to bestow mechanical dexterity; it must combine observation and experiment with action, and culminate in the formation of perfect cognitions. The school, as a place of education, will gradually recognise more and more the value of the child's active participation and enlist it in her service. It is not for us to force on the school a means of education not yet desired, but rather to elaborate our instrument, which, when the fitting time is come, will be spontaneously demanded by the developed school of the future.

Whilst, however, we leave the introduction of Manual Training an optional matter, we by no means desire the instruction to remain completely isolated from the school and altogether out of touch with it. Such isolation would prove injurious to our cause, because, in that case, pedagogic considerations would be by degrees obscured, and mere technical features become more and more prominent. That was the history of a similar movement, which, as we have said, failed in spite of its original strength. The work-schools were isolated; there was nothing to connect their teaching with that of the school, and the former was presently placed on an inferior footing. A division grew between the teachers of manual work and those of theoretical subjects, until the latter held themselves completely

aloof. Manual instruction became purely mechanical, lost itself in external routine, and sank to be only a means of promoting material interests. Its extinction was therefore no cause of regret. It is for us now to learn a lesson from the past, and to strive with all our strength that Manual Training may maintain its educational character and enter into closer connection with the school. This result is obtained by making it an optional subject. With the same end in view, we insist that it shall be entrusted to the schoolmaster. When once the relation between school and manual instruction has been established by the fact that not only the pupil, but the teacher is the same in both cases, the question arises whether this relation ought not to be a still closer one. May not the workshop derive its tasks from theoretical school instruction only, the practical work serving to illustrate the latter? There are some educationists who only favour manual instruction for the services they hope to derive from it for other branches. Others think that Manual Training would be an important aid, even if it asserted the independence of its work, and took none of its tasks from mathematics, geography, natural science, or physics. Our own position towards this important question we have stated more particularly in the section on '*Tasks to be set.*' Our firm conviction is that if Manual Training is to bear fruit, it must not relinquish the idea of a methodical structure. Such a structure would be manifestly impossible if other subjects were to supply the tasks, difficult or easy, as suited their requirements. On the other hand, it would be absolutely wrong to exclude on principle all tasks in connection with school instruction. All that is necessary is, that the tasks derived from outside subjects should take their proper place in our scheme of work. Experience has proved that boys work with just as much delight at objects taken from school life as at useful domestic articles. The secret is really to enter into the sphere of their ideas. The joy of finding conceptions that

have been left indistinct by verbal instruction cleared up by observation and experience, the feeling of satisfaction in understanding the lessons better than before, is just as great as the delight of making articles for daily use. Those who are enthusiasts for the production of practically useful articles might here take a hint. We shall win the interests of schoolmasters, whose assistance is of great importance to us, far sooner by setting tasks which have connection with their branches of instruction. Moreover, in such tasks artisans can absolutely find no excuse for the fear of competition. Under no circumstances, however, must we lose sight of our aim; we must ever strive to create one consistent and perfect method for Manual Training. When we have once established a properly graduated, logical method, then the application of our work to other subjects will follow as a natural consequence, and the school will reap the fruits. It will be clear to any one who has followed the dispute between those who desire independent manual instruction and those who insist upon its application to the work of the school, that the two parties are in reality contending for entirely different things. Manual Training must recognise its mission to clear the way which leads from action to knowledge. When this has been done, if the pupil masters the elements of practical work, he will also be able to retrace his steps from knowledge to action, should work in the school require it. It is the task of the workshop to teach boys to work faultlessly and to handle the simpler tools with technical skill. It is for the school to give them the impulse and the necessary information how to realise by simple '*intuitive*' methods, the subjects they have treated theoretically in the different branches of instruction, and thus to make what they have learned their own mental property by self-activity. They will bring with them from the workshop the capacity to do this. We therefore think that Manual Training should carry on its teaching independently, but in a thoroughly educational spirit. The

school proper should provide a complement to its own teaching, in order to give to the work-school tasks to which the latter can apply its practical work.

LITERATURE ON THE SUBJECT OF APPLIED INSTRUCTION :—

Barth and Niederley, *Die Schulwerkstatt*, Bielefeld and Leipzig, Velhagen & Klasing, 1882 ; Bruhns, *Die Schulwerkstätte*, Vienna, Alfred Hölder, 1886 ; Götze, *Die Ergänzung des Schulunterrichts durch praktische Beschäftigung*, Leipzig, Heinrich Matthes, 1880 ; Groppler, *Ist der Arbeitsunterricht zu einem selbständigen Unterrichtsgegenstande zu entwickeln, oder soll er nur zur Förderung anderer Unterrichtsgegenstände in den Dienst derselben gestellt werden ? Bericht über im den X. Kongress für erziehliche Knabenhandarbeit zu Strassburg*, pp. 149–156 ; Dr. E. Höhn, *Die Bedeutung des Handfertigkeitsunterrichts für die höheren Schulen*, Bericht, etc., for 1890 ; Dr. E. Höhn, *Der Handfertigkeitsunterricht und die höheren Schulen*, Eisenach, 1887 ; Joseph Kumpa, *Anschauung und Darstellung*, with 38 diagrams, Darmstadt, 1890, published by the Author ; P. Kunath, *Der Einfluss der Handfertigkeit auf die Anschaulichkeit des Unterrichts*, Bericht, etc., for 1890 ; Magnus, *Der praktische Lehrer*, Hildesheim, August Lax, 1886 ; Magnus, *Die Stellung des Arbeitsunterrichts im Lehrerseminare*, Bericht, etc., for 1889 ; Nöggerath, *Über den Unterrichtsstoff der Knabenhandarbeit in den oberen Klassen höherer Unterrichtsanstalten*, Bericht, etc., for 1889 ; H. Scherer, *Der Handfertigkeitsunterricht und die Volksschule*, Bielefeld, A. Helmich, 1890 ; *Die Frage der Knabenhandarbeit auf dem VIII. Deutschen Lehrertage zu Berlin*, published by the German Association for Manual Training, Berlin, 1890.

The above-named books by Barth and Niederley, Kumpa, Kunath Magnus, and Nöggerath supply many connections

between practical occupation on one hand, and intuitive instruction, arithmetic, natural science, geography, mathematics, and physics on the other hand. Experience proves unmistakably that tasks for the benefit of school instruction suggest themselves as soon as the connection between the manual work school and the theoretical school is regularly established.

RELATION OF MANUAL WORK TO GYMNASTICS AND DRAWING.

If manual work is closely connected with the above-named branches of instruction by virtue of the *tasks* set, it is, on the other hand, related to drawing and gymnastics by virtue of its *nature*. Like drawing and gymnastics, Manual Training appeals to the child's self-activity in contrast to the other branches, which leave the pupil passive. It is impossible to imagine such a thing as drawing and gymnastics without the actual participation of the child. Manual work now enters a third in the league between gymnastics and drawing, as a new branch of practical instruction. It has in common with gymnastics the vigorous bodily exercise and the exertion of a large number of muscles; by it the circulation of the blood is rendered more rapid, and the breathing more free. Hard breathing is beneficial to the boy's lungs. It extends them equally in all directions, and they thus become stronger and more developed. Moreover, both gymnastics and bodily work increase the appetite for food, quicken the power of assimilating it, and exert a favourable influence upon the general state of the body. It might be doubtfully objected that manual work only brings into play the muscles of the arm and the hand, whilst gymnastics tax the whole muscular system. But medical men inform us that, as the muscles of the hands and arms perform their functions, 'a large number of muscles in the back, chest, pelvis, and lower extremities render auxiliary

service in supporting the body and in securing the ends of the muscles immediately engaged' (Kristeller, *Turn-und Handarbeitsunterricht in pädagogischer Beziehung, Bericht, etc.*, for 1891). Gymnastics, it is true, call for a greater exertion of strength than manual work generally requires. In compensation, the latter exercises particularly the smaller and finer muscles, and affords in addition a sort of gymnastic for the nerves, to the great relief of the brain. This fact has been established by Dr. Birch-Hirschfeld, *Bericht, etc.*, for 1888: 'Manual Training works on the organs of sense in a higher degree than gymnastics do; it brings eye, muscle-sense, and sense of touch into prolonged and combined activity; it works on the outlying domains of our nervous system.' This schooling of the senses as organs of the mind is a very characteristic achievement of Manual Training.

Lastly, the way in which the instruction is given differs essentially from that adopted in gymnastics. The work is not done under strict discipline, to the word of command. It is freer, and its note is unconstrained movement. Hence it can be more readily *individualised*: the tasks can be suited to the powers of individual pupils. Thus, weaker boys and those to whom on account of special diseases, such as hernia, hip disease, poverty of blood, or palpitation of the heart, gymnastics are forbidden, may take part in the work to the great benefit of their health.

There is thus every reason to believe that Manual Training, close as may be its relationship to gymnastics, fulfils its own special purposes, and has effects which no instrument of education can replace it in producing.

With drawing manual work has this in common, that it claims hand and eye for its service. As in drawing, the pupil attests by his work that he has seen aright; he gives, as it were, a voucher for the impressions he has received from without. Nor is it only by the similarity of operation that the two subjects are connected. Our work involves

drawing, and by calling for frequent and profitable exercise of the art, renders it material assistance. We demand inflexibly that a boy shall first draw unaided the work he is to do. Seeing the applicability of drawing, or rather its indispensability, he acquires a knowledge of its value which the more abstract methods of ordinary school-teaching too often fail to bestow.

First of all, cardboard-work, bench-work, metal-work, and, in particular, chip-carving, give constant occasion for geometrical drawing—that is, for practice in the use of ruler, square, foot-rule, and compasses. If we consider of what value geometrical drawing is to practical life, we may well desire that schools should introduce, side by side with freehand drawing, a methodical course of exercises in the employment of square and compasses, ruler and centimetre-measure. As this, however, is not to be expected, we must welcome the ever-recurring necessity of such drawing in the course of manual work as a valuable service to practical life, and as a boon to the general education of the boy, inasmuch as it fixes and corrects his geometrical conceptions and ideas.

With freehand drawing our moulding stands in the closest possible relation. In it drawing finds frequent application; indeed, as Hertel says (*Das Formen in der Handfertigkeitsschule, Bericht, etc.*, for 1891), moulding supplies freehand drawing with the foundation it has hitherto lacked. 'The greatest gain will fall to freehand drawing. Moulding will release it from the barren artificiality of pattern-drawing as well as from the one-sidedness of ornamental drawing. Through moulding drawing will become, what it may and must become even in elementary schools, a means of representing all ideas of form, come they from what quarter they may.'

We find then that drawing and manual work react powerfully on each other, and we see too how one serves the other. But here again it can be shown that the system we

advocate exerts a special influence which drawing cannot command. Manual Training proceeds from chequer-drawing on the plane to the representation of solids in space. Besides the two dimensions of the plane, length and breadth, it has at its disposal the important third dimension, and so can introduce the child to the world of solids. Drawing translates, so to speak, a visible surface or solid into the two dimensions of the plane. Its purpose is to reproduce the outer appearance, the shape of the object, as it appears to our eye. The image of the body, reproduced on the plane of the paper, is an abstraction from the body, just as a word, the name of an object, is an abstraction. But Manual Training teaches concrete reproduction of form. It is not, however, here a question merely of an altered or extended system of form-expression. The aim is no longer simply to reproduce the outward shape, but to show also the inner connection of the parts, and how to make for one's self the means of joining them, be it by screws or rivets, by dovetailing or groove-jointing; to deal with materials as their nature requires, and to teach the qualities of tools and the method of handling them correctly. Surely these are characteristics of Manual Training sufficient to invalidate the objection that all its effects are already accomplished by gymnastics and drawing. That its work is not superfluous, those who know it best are best aware.

IX.

THE POSITION OF MANUAL TRAINING IN PARTICULAR EDUCATIONAL INSTITUTIONS.

Our treatment of manual instruction in Germany would not be complete without at least a brief account of the difference of form it assumes in various educational institutions according to their special aims.

KINDERGÄRTEN.

I take it for granted that everybody knows how fundamental a part the activity of the child plays in Fröbel's Kindergarten. Fröbel was firmly convinced that through *doing* man is led to thinking and knowing. So strong was his conviction of this, that he made the activity of the child the centre of all his educational theories. His way leads from *doing* to *knowing*, and he thus places himself in direct opposition to the school of Pedagogy, which says that the impulse to think is innate in man, and which therefore appeals immediately to it without any further preliminary. Fröbel's idea is to lead his pupil to knowledge also, but he begins with *doing*; for, according to him, the aim of activity is to rouse in the child the desire to perceive and to know. It may be considered an exaggeration to place work in the centre of education, and derive from it all other branches of instruction. We may perhaps demand that those studies which are in direct connection with the moral and religious formation of the character should be retained as the centre of any educational system. Yet it must be owned that Fröbel made a happy choice when he made practical occupation the connecting link with the child's interest. For in the methodical cultivation of such interest we have an admirable means whereby to promote the intellectual and moral development of the child. It is not the often far-fetched object lessons, nor the sometimes very unpoetical songs, that have given to the Kindergarten idea the victory over all opposing forces, caused it to spread over all civilised countries, and assured its existence for all future time. On the contrary, its success must be attributed to Fröbel's principle of employing the child, and to the occupations he devised for that purpose. The same idea of *education through work* has brought forth another and vigorous offshoot in the Northern Slöjd. Uno Cygnäus was the founder of the Finnish School system, the system in which practical

work first found admittance as a branch of instruction. He himself says that his work was an outcome of his study of Pestalozzi and Fröbel's writings. It has often been pointed out with good reason that Manual Training, coming back to us from the North, is nothing but a further development of Fröbel's idea, adapted for children of a more advanced age. If practical self-activity may be called the soul of Kindergarten life, we may then justly say that we but continue for boys of the school age what Fröbel began for infancy. When the method of instruction in the preparatory grade has made further progress, and the gulf between Kindergarten and work-school been thus bridged over, then, and only then, shall we be able to say that the idea of making self-activity a means of education for our rising generation has received full recognition.

INDUSTRIAL INSTITUTIONS AND 'KNABENHORTE.'

Manual work assumes a very different meaning in the 'Knabenhorte,' or homes for boys, for here it is the moral influence of work that forms the chief feature. The Knabenhort is meant as a substitute for family life. The boys in these asylums are intended to live together like the members of one large family. Though these particular institutions have only sprung up during the last few years, there have long been establishments where children are occupied during the hours they are free from school, and thereby drawn from idling in the streets. Those are the Industrial Institutions for Children, or Work-schools, the first of which was founded at Darmstadt about 1828. It developed into a flourishing institution, and is still a blessing to our boys. There were, and still are, a large number of such institutions in different places, and they certainly, all of them, exercise a beneficial influence on the morals of the young, by drawing them from street-life, and accustoming them to diligence, order, and economy. But

it cannot be said that they extend their operations to all classes of children, nor that they are assisted in their endeavours by any large circle of public sympathisers. The reason of this may be that they make the earning of money the important point, whereas what the children above all need is a compensation for family life. Besides, the work the boys do, such as straw-plaiting, cane-plaiting, wool-picking, etc., is altogether too mechanical. The children are always doing the same thing; they must become expert if the work is to pay. On this account industrial homes become very much like manufactories. In regard to the choice of the work, again, I hold that the best is not too good for boys. The work must be educative, but the products of such educative work, by which the intellectual and physical strength is gradually developed, are not fit for sale. They cannot possibly be so finished as to command a market price. In brief, work that educates cannot pay, and work that pays cannot educate. We should therefore give up the idea of making money by children's work, and be content that their productions should be of use in their parents' houses, or serve as decorations for their own little rooms. The most wholesome and most educative of all the kinds of work done in those industrial institutions is gardening. Perhaps it is not a mere fortuitous coincidence that it is just these garden work-schools which have flourished most. Side by side with these industrial institutions there sprang up at a later date the Knabenhorte. The aim of these is not so much money-making through children, as the endeavour to bestow on them the training so often neglected in poor families. One of the principal means is practical work. Indeed, on a winter's evening there is no better employment of the leisure hours than such occupation. The boy takes it up with the greatest interest, for it corresponds with his natural inclination to be busy making something with his hands. This natural bent, if neglected, becomes a propensity to destructiveness. The busy boy,

absorbed in his work, and following its progress with true enthusiasm, forms indeed a delightful contrast to the mischievous lad, who, through the evil influence of street-life, drifts downwards into moral depravity. So firmly convinced am I that practical work is the best educational means for Knabenhorte, that I cannot picture such places without it. And I am not alone in my opinion. The tasks may very well be articles for domestic use, or playthings for the child himself. If a boy carves a little frame for his father's picture to decorate the humble home, or if at another time he brings to his mother some neatly smoothed sticks for her flower-pots in the window, or a knife-box for daily use, are not such little presents welcomed? Manual Training, however, as it is carried on in the school, cannot, for many reasons, be transplanted into the Knabenhorte. Often forty children or more are entrusted to one teacher, who consequently must confine himself to mere superintendence. The ages also of the children are too varied. They range from the sixth to the fourteenth year, so that only groups comprising but few boys can be employed in manual work. The most important thing seems to me, under such circumstances, to inspire the boys with an interest for practical work, and to encourage them to cultivate it in their own homes. With this in view, we must choose such tasks as can be done with the simplest tools, perhaps with the knife alone. The simpler the tools, the easier it will be to stimulate domestic industry by means of them. If such Knabenhorte would everywhere take up the battle against ignorance and demoralisation, it would prove a blessing to the poor forsaken children, and, through them, to our beloved country.

MANUAL TRAINING IN 'INTERNATE.'¹

In 'Internate' special importance has very properly always been attached to practical work. However different

¹ See p. 229.

the characters of such institutions may be, whether they are orphanages, compulsory training schools, asylums for the deaf and dumb, or homes for the blind, they all have this in common—that they seek to give their inmates some substitute for family life, for the parental roof. Hence, it seems to me, they have urgent reason for cultivating Manual Training; they are confronted by the necessity of finding an equivalent for the many opportunities of bodily exercise that family life brings with it. In every well-ordered household duty discharged is followed by leisure; so in the Internate, after the hours of work come times of recreation. Is the book here again the only means of recreation? Would not the refreshing change from mental to bodily exertion in itself afford natural and healthful relaxation? Many even of those who dispute the general significance of Manual Training, fully recognise the necessity of it in such institutions as we are now considering. Nor is it difficult to understand why the old attempts at a system of manual education, though long extinct in our open public schools, have survived in Internate to the present day, especially as the material gain is an object when boys must be kept as well as taught. This accounts for the fact that in them manual work bears a very different character from that which it assumes in the school workshop, and occupations are cultivated which must be excluded from the latter as tending to become purely mechanical. But the difference need not be so absolute. Educational manual work, which the Internate require to attain their special objects, should not be stifled by wholesale reproduction to a given pattern, with money gained as a result, but with no joy or moral profit for the workers. Such circumstances as make it possible for the *Hausväter* to say that they have no time to spare for work as education, should be rectified. It will be not the meanest result of our movement if it exalts educational manual work again to honour where it has been supplanted by instruction given mechanically, and upon no

definite system. There must at least a sharp distinction be drawn between manual instruction, as we understand it, and occupations for secondary purposes. All work done to supply the household wants of the institution will be perfectly justifiable; for the Internat may be regarded as a household with many members. But work for sale outside can only be defended as a financial expedient; to pursue the analogy of the Internat to the family, it is like the extra work, not that of their proper calling, done by poor people to increase the joint income of the household. Of course such secondary employments must not be allowed—as they sometimes are allowed—to oust the principal work, which is, in our view, education.

On the nature of educational manual work in asylums for the deaf and dumb, and on the special reasons which plead for its introduction into them, light has been thrown by E. Göpfert in the *Bericht, etc.*, for 1890. It is, he argues, first of all required on the same general pedagogic grounds as in the case of those who have the use of their ears. Again, it is for the deaf and dumb a particularly valuable means of influencing their intellectual development. It contributes considerably to the most important part of the instruction of the deaf and dumb—the teaching them to speak. It affords many opportunities of enriching the vocabularies of the pupils, constantly obliging them to practise themselves in the use of the spoken language. For instance, a practical manual lesson brings into application all forms and tenses of the verb, and this in a natural and intuitive and consequently comprehensible way. Thus the lesson becomes, at the same time, an effective means of intuitive instruction in language. Moreover, Manual Training in a school for the deaf and dumb might serve in many instances to further the teaching of other subjects, such as linear measurement, the calculation of the sizes of surfaces and solids, the drawing of the objects to be made, etc. ..

We must further remember in connection with asylums for the deaf and dumb, that the pupils, almost without exception, are obliged to make their living as artisans after leaving the institute. And as for them their apprenticeship obviously offers great difficulties, compared to the apprenticeship of normally gifted boys, the duty of supplying its pupils with a certain amount of manual skill, practical knowledge, and understanding, devolves upon the asylum in order to prepare the mutes for the exigencies of life. And this can be done all the better, as the deaf and dumb generally leave school at a more advanced age than children who have their hearing do, and as, on the whole, they are quite as well gifted for manual work as the latter. The want of hearing is not so much an impediment to educational influence in manual instruction as it is in other subjects. Our first duty in these asylums is to train the eye, which, owing to the lacking sense of hearing, is of vital importance for the intellectual development of the child; and drawing assists us to open to the deaf and dumb the world of form. Those to whom the harmony of language and the whole realm of sound are for ever closed, ought to receive some compensation in being rendered capable of enjoying nobility and beauty of form.

In the education of the blind Manual Training assumes a very different position, as G. Görner has shown in his contribution to the *Bericht, etc.*, for 1891. To his mind, Manual Training is the most suitable means of remedying the bodily helplessness of the blind child, and especially the awkwardness of its hands. The happiness and the social comfort of the blind person 'depends chiefly upon how far he has learned to govern his body, and more especially how far he has learned the skilful use of his hands. For it is not so much the want of sight itself as the unskilfulness of his hands, that makes him dependent on the aid of others; and it is this dependence on extraneous assistance that constitutes the real misfortune of the blind.' Manual

Training also contributes considerably towards guarding the child against a one-sided and abstract activity of the mind. Those deprived of their eyesight like to retire into the world of their fancy, and they are fond of dreaming and creating by the imagination a world in themselves, to which the real world does not correspond. Manual work, however, is very well suited to turn the mind of the blind child towards the outer world. It affords opportunities of comparison, comprehension, judgment, and inference, and thus leads to healthy intellectual activity. It cultivates and exercises the sense of touch; thus, the intuitions of the blind child are multiplied, made more distinct and more real, and the knowledge acquired in other branches of instruction is completed. Last of all, manual work prepares the afflicted, here as in the school for the deaf and dumb, for the necessity of earning a livelihood in practical life. The asylum frequently takes upon itself actual professional training besides the school-instruction of its pupils.

In the case of the blind the teaching is very much more difficult than with normal, or even with deaf and dumb pupils. But the system of Education for the Blind has done admirable work in the way of adapting the means of instruction to the condition of the pupils. It is almost incredible with what dexterity blind children employ themselves with such Kindergarten occupations as building, plaiting, folding, and stitching; how they are even able to accomplish simple tasks in wood-work, cardboard and metal-work. Instruction in modelling, so indispensable for the development of the sense of form, and for impressing clear ideas, has hitherto thriven best. It has therefore been introduced in all German asylums for the blind, and some have brought it to a high state of perfection. It has become a real means of mental communication and intuitive instruction in many departments of education, such as natural science, local geography, and geometry, and it affords to the instructor of the blind the possibility of testing the

correctness of the impression which the pupil has received. It also proves to us who see to what a degree of sensitive-ness touch may be developed, if only it be included in the plan of education.

MANUAL TRAINING IN SEMINARIES OR TRAINING COLLEGES FOR SCHOOLMASTERS.

Nowhere is it so important that manual work should be carried on as in our seminaries or training colleges; for through young teachers, whose interest has been enlisted at the training college, it will spread quickly and easily among our boys. Some account of the importance and position of the subject in such institutions ought not, therefore, to be omitted here.

It can easily be shown that seminaries, more than any other places of education, require a course of Manual Training. Serving in many cases as Internate, and affording their inmates a substitute for the parental roof, it is most desirable that they should possess a workshop where physical recreation may be had and leisure hours employed. Again, they are, above all, educational institutions, whose pupils need, for themselves in the first instance, education as well as instruction. All the reasons, therefore, that plead for the adoption of manual work as a means of education, apply with full force to the seminary, and especially to its lower classes. When we say that the schooling of hand and eye is absolutely necessary for the harmonious development of the whole man, we can hardly exclude the members of seminaries from the benefits of this schooling. If, moreover, intellectual life is enriched by the experiences gathered from practical work, if Manual Training serves to widen the circle of intuitions, and if interest in the subjects of theoretical instruction is awakened and intensified by it, we may well desire that our future schoolmasters should be brought under its beneficent influence. Again and again we see how the

young delight in the exercise of their physical strength, how profitable the change is from labour with the mind to labour with the body, and how psychologically correct it is to connect *knowing*, which can never be complete, with *doing*, which affords us the joy of producing finished, if simple, things. Again and again we observe what great educational value the strengthening of the will through self-activity possesses, and how necessary it is to allow the formative impulse, innate in man, and only to be repressed by force, to expand and energise. Surely there are strong arguments here for the introduction of Manual Training into our seminaries. Confronted with objections on the ground of overwork, we can but repeat that it is not the number of subjects taught, but their monotony, that causes the strain and leads to weariness of study and precocious languor. Let us then give the pupils of our seminaries Manual Training, for they too need strength and vigour for entrance into the field of life, where their true work begins.

In the presence of such weighty reasons, what becomes of the objection, so often revived, that there is no time to spare for manual instruction? We must as often reply that work with the body is a recreation, never a burden for the tired mind. If Manual Training had no other effect than in counteracting the tendency to idle, foolish, and immoral distractions by the delight of work, it would deserve its place in the seminary as in the school. My conviction is, that it is not want of time, but mostly prejudice against practical work, and the under-estimation of its eminent educational value, that has led to this plea of want of time. Do not the *Präparandenschulen* and seminaries in Baden, Saxony, Württemberg, and Prussia, which have actually introduced Manual Training, prove distinctly enough that, wherever there is the will, the time required can be found? The seminary, however, needs manual instruction not merely because it is an Internat and school of education, but also because it is a special school for the training of teachers.

The teacher learns in order to teach, and the aim of his training is, above all, to enable him to give simple, intuitive, and practical instruction in a public primary school.

The young teacher may be intent on awakening the interest of his pupils, and on furthering his success in instruction by vivid intuitive teaching and by the cleverness of his description. But this is not sufficient. He must also learn to make the objects for intuitive instruction with his own hands in the simplest manner. In the country, especially, how small are the stores of objects for intuitive instruction, how great a proportion of instruction remains fruitless, because it is based on words, which in many cases have not the power of forming or of developing clear ideas in the children's minds. A teacher who has some practice in drawing, or, still more, one who is skilful enough to produce out of the commonest material means and objects illustrative of his theme, more than makes up for the lack of an expensive collection of such demonstrative objects. Nay, he does better still, for he gives life and interest to his simple means of instruction. It would therefore be a good use of manual instruction if teachers in seminaries, after having learned to master the elements of practical work, practised their skill on tasks which lie within the sphere of school-instruction. While making such objects, illustrative, for instance, of arithmetic, geometry, geography, natural science, or physics, the student is constantly obliged to keep his thoughts on the management and use of them. That which he has acquired in theoretical instruction is thus indelibly impressed upon his mind. The capacity and the wish in him to impart vivid intuitive instruction is increased, and the efforts thus made by the future teacher are sure to bear good fruit. We get much information as to the means of obtaining these results from J. Kumpa (*Anschauung und Darstellung*, Darmstadt, published by the Author, 1890), from P. Kunath (*Der Einfluss der Handfertigkeit auf die Anschaulichkeit des Unterrichts, Bericht, etc.*, for 1890), and from Magnus (*Der*

praktische Lehrer, Hildesheim, Lax, 1886, and *Die Stellung des Arbeitsunterricht im Lehrerseminare, Bericht, etc.*, for 1889).

Practical work will also be a means of bringing the young teacher into contact with practical life, of originating and giving form to his intercourse with the community in which he works. Imagine the situation of a young teacher coming straight from the seminary in which he has been kept in almost cloister-like seclusion. He finds himself confronted with the task of educating and forming the rising generation for a life to which he is himself a stranger. How can it be contended that he knows the requirements of that life or the wants of the people? We do not mean that Manual Training would impart this knowledge to the student, but it would give him an interest in and a means of understanding practical life, far more serviceable than the customary disparagement of bodily labour. Robert Seidel, in his excellent book, *Der Arbeitsunterricht, eine pädagogische und soziale Notwendigkeit*, writes as follows: 'Now-a-days a schoolmaster, and especially a young one, is a mere child in practical things, the butt of every peasant and 'prentice lad. Practical skill will effect a change, and will raise him not a little in public estimation. The increased respect of others, and the consciousness of his own mastery of the practical details of life, must increase his justifiable pride in his vocation. If, at the same time, the unjustifiable pride which is based on scholastic knowledge rather than on social and moral worth, receives a fatal blow, the loss will be pure gain to the whole profession. It is a general weakness to overvalue dead, theoretical knowledge at the expense of real, living knowledge and power.' 'Manual Training will not make the schoolmaster a smatterer, but more competent in his vocation; and more profit will accrue to the school from his practical education than from his learned helplessness.'

We pass on to consider the method of pursuing manual instruction in training colleges. As to the *persons* employed

as teachers, I for my part am opposed to the introduction of master-workmen in this capacity, because schools of education need only such teachers as consciously co-operate in the execution of a general plan. To entrust Manual Training to an artisan is to oust it from its place in the scheme of education and reduce it to the level of mere technical instruction. I am convinced that it is for this very reason that Manual Training does not thrive in some seminaries where it is carried on. As soon as a competent teacher belonging to the seminary undertakes the work, and treats it as supplementary to other subjects, the whole thing appears in a different light. The instruction gains depth for itself and respect in the eyes of the learners. If, however, the system which has hitherto prevailed is continued, we must at least insist that artisans who give lessons in seminaries should make themselves acquainted with the improvements in method which have resulted from ten years' energetic work. The courses for different branches which have been elaborated in the prolonged struggle for methodic development in Germany and in other countries should be brought into the service of the training college as well as of the school workshop.

The *place* where the instruction should be given is, of course, the seminary itself, and not the smithy or joiner's shop, even if it be only for convenience in employing the leisure hours of the students. Most desirable is a separate room for use as a workshop. Otherwise, as in schools, the drawing-room or gymnasium may be made available.

To sum up the requirements of Manual Training in seminaries, it should include the technical elements of work in paper, cardboard, wood, and metal; it should have from two to four hours a week allotted to it, and the lessons should be given by technically qualified teachers in a workshop connected with the institution. Moreover, manual work should be brought into the closest possible relation to the general teaching by reproducing practical illustrations of

the various subjects taught. Lastly, the students should be allowed to work in their leisure hours by way of recreation from mental strain.

X.

MANUAL TRAINING ABROAD.

However desirable it may be to give here a connected account of the spread of manual instruction and its practical development in other countries, such an account would exceed our limits. It is, moreover, very difficult to obtain the necessary material in a correct and trustworthy form. Considering the rapid development the cause has found in all civilised countries, the material obtained would soon be obsolete and deficient. We can only follow this marvellous progress by reading the details given in such periodicals as the organ of the German Association for Boys' Manual Training. In the literature of the subject the only book I know of which treats of its spread is Gärtig's translation of Salomon's *Handfertigkeitsschule und Volksschule*. The Report of the eighth German Congress at Munich, 1889, contains some interesting reports and communications as to the movement in Austria, Russia, France, Belgium, Switzerland, Sweden, and Denmark.¹

Manual Training is carried on with special zeal in the Northern countries, Sweden, Finland, Denmark, and Norway, and is cultivated in France, Belgium, Switzerland, and Austria. England and North America have also of late taken up the movement energetically—a matter of great importance. Even in Russia, leading circles show themselves favourable to it, and communications from many quarters prove that the cause is making good progress there. Not only in Finland, where manual instruction has long

¹ Compare Dr. Götze, *Der Arbeitsunterricht im Auslande und in Deutschland*, Leipsic, Hinrichs, 1892.

since been established, and in the Baltic Provinces, where very promising beginnings have been made by the Germans, but also in St. Petersburg, various attempts at education through work are receiving manifest support.

The first country where manual instruction was acknowledged as a branch of instruction with full rights in the primary school, was Finland. The decree by which it was added as an obligatory subject to the courses of training colleges and town and country schools throughout the principality of Finland, was issued in 1866. In the training colleges manual instruction comprises bench and metal work, wood-carving and basket-plaiting. The instruction is not given by artisans, but by teachers. No competition with the various crafts is intended. The object is simply to impart a genuine manual dexterity to the scholars.¹

Swedish Slöjd, originating in a purely economic movement for the revival of domestic industry, afterwards assumed an educational character. Whilst the promoters of Slöjd may have been influenced by the example of Finland, it would be going too far to assert that the Swedish system is a mere branch of the Finnish. The economic societies had long been advocating and supporting domestic industry, when in 1872 the Swedish Parliament voted a sum for its furtherance, and at a later time considerably increased the amount. In 1877 it granted a special subsidy for Slöjd instruction to boys; whilst in 1881 the sum was so much augmented, that every school where Slöjd is carried on may receive a grant of seventy-five kronen. From the regulations dated 11th September 1877, we single out the following provision: 'The instruction given must aim at producing, not dexterity in any given craft, but manual dexterity generally, and ability to use the most familiar tools.' Founded by August Abrahamson, and conducted by his nephew Otto Salomon, the Slöjd Training School for Teachers

¹ Practical occupation is to be carried on in such a way that the themes of mathematics and natural science find application in it.

at Nääs became the home of pedagogic Slöjd. Its influence has extended far beyond the borders of Sweden to every civilised land, and its fame, with steady growth, has become world-wide. I refer my readers for further particulars of the Northern movement to my book, *Werkstücke zum Aufbau des Arbeitsunterrichts*, Leipsic, Heinrich Matthes, 1887.

The attitude of France towards Manual Training, and the importance of that attitude, has already been referred to. Of literary sources for the study of the French system we have, besides the address of the Inspector-in-Chief of Public Instruction in France, G. Salicis, to the Munich Congress of 1888, three recent publications of great interest: Franz Kamény, *Beiträge zur Kenntnis des modernen Volksschulwesens von Frankreich*, Gotha, Emil Behrend, 1890; Dr. Max Weigert, *Die Volksschule und der gewerbliche Unterricht in Frankreich*, Berlin, Leonhard Simion, 1890; Edouard de Kovalevsky, *L'Enseignement de l'Agriculture dans les Ecoles Normales et Primaires en France*, Notes sur l'Enseignement du Travail Manuel, St. Pétersbourg, 1891. The last-named 'Notes,' which afford an interesting insight into the nature of French Manual Training, have been reproduced by me in German in the *Arbeiterfreund* for 1891, Second Quarterly Number, Berlin, Leonhard Simion; the little work has also been published separately. Considering the great significance the French system has for us, I deem it advisable to quote here the observations addressed by Dr. Weigert, who, during the Paris International Exhibition, had been commissioned by the Berlin magistracy to make a minute study on the spot of French and especially Parisian schools, to the last general meeting of the Berlin Association: 'While in Germany the Association for promoting Educational Hand-work among Boys has numerous obstacles to overcome, in France the whole matter lies in the hands of the State; the success, therefore, attained in France is very much greater than in Germany. When the Republic began to recover from the disasters of 1871, its most earnest

endeavours were centred on the reorganisation of the whole school system, until then in the hands of the clergy, in order to bestow a better training on the masses of the nation, and thus to elevate the standard of general education. Since 1880 there have appeared in quick succession epoch-making educational edicts, causing unexpected developments in the school world. The Republic did not shrink from logical consequences, nor from bearing the heavy expenses. While in 1870 only 73 million francs were spent for general education, in 1887 the sum had risen to 173 millions—certainly the most profitable investment a nation can make. The law of 1882, on the organisation of the elementary schools, gives the education of children from their fourth to their seventeenth year (infant schools, higher grade, national schools, or technical schools) into the hands of the State. By this law the courses in those schools comprise Manual Training as a compulsory and gratuitous branch of instruction. The legislator was, first of all, influenced by the general reflection that manual work, being the source of national wealth, must be rendered accessible to all Frenchmen. He also realised that whatever else had to be righted, manual work must be restored to a position of honour, and be placed on a level with theoretical instruction. Above and beyond all, the special purpose which he had in view was based upon practical considerations. He desired to prepare the future citizens of France for their callings in life by a thorough training of hand and eye, and by acquainting them at an early age with the correct handling of simple tools. Thus, theoretical instruction was permeated and vivified by a refreshing element, and a great service was rendered indirectly to trade and art industry. It is evident that it would take more than eight school years before this legislation could bear fruit, or come to perfect development. The difficulties of providing funds, buildings, and above all, suitable teachers, have been enormous; yet

very much has been done in this short time. First, teachers of manual work have been excellently trained in a most systematic manner at the higher grade seminary at St. Louis. These qualified teachers were appointed as teachers in provincial training colleges; a large number of the teachers required have thus already been supplied. At present methodical manual instruction is carried on in France in about 19,000 schools, but amongst these there are only 650 schools which have special workshops, while the others for the present content themselves with such instruction as can be imparted in classrooms. It is natural that the larger towns especially, and above all the capital, should have succeeded best in carrying out the provisions of this law concerning Manual Training. In Paris the value of such instruction was recognised before legislation enforced it. There had existed there since 1873 a school under the direction of Salicis, which had made Manual Training its special task, and devoted three hours to it daily; in other respects it was an ordinary elementary school. This school had finally become a little training school for apprentices, and went far beyond the elements of manual work. The committee appointed after the promulgation of the law, came to the conclusion that in the public elementary school only the elements of manual work could be taught, and that the preparation for apprenticeship must only be an indirect one. The plan of work now used is one which has been carefully elaborated, and is based on sound pedagogic principles. At present 40,000 public school children of the French capital enjoy the blessings of manual instruction; besides 23,000 children in the Kindergärten, where easy occupations on Fröbel's system are carried on. One hundred and thirteen elementary schools have special workshops, furnished with benches, vices, lathes, etc., while the children of the remaining schools can as yet only get such instruction as can be imparted in school classrooms, *i.e.* instruction in plaiting, folding, paper-cutting,

wire and cardboard work, and modelling. Nine hours a week are devoted to Manual Training, four of them to drawing and modelling, and five to ordinary manual work. All of them are so arranged as to come between hours employed in theoretical instruction. The practical instruction in the workshop is always preceded by theoretical information about tools and materials. Every manual work teacher has a competent master-workman as his assistant, so that now ninety-one joiners, ninety-one turners, and seventeen locksmiths are employed as technical advisers, and they, as well as the trained teachers, receive good salaries. The expenses which the city of Paris incurred in 1890 for the carrying on of manual instruction amounted to 486,000 francs. Comparing these figures with those of the German Imperial capital (325 pupils and an allowance of 1800 M. from the town) we see how much still remains for us to do in this matter.'

In England the development of Manual Training has been influenced by Sweden, and recently by Germany. The value of the idea once recognised, immediate steps were taken to realise it, and Manual Training was embodied in the Educational Code as an optional subject. The regulations, dated 5th June 1890, are to the following effect:—

Instruction must be given (*a*) in the use of ordinary tools, such as are required for work in wood and iron; (*b*) out of school hours in a special workshop; (*c*) in connection with the teaching of drawing—that is, plans of the work on a smaller scale must be first drawn by the pupil. The instruction may be given by one of the school teachers, if properly qualified; otherwise an expert workman must assist him. If inspection shows that the instruction is given on a good system, a grant of six shillings, or if plan and method are excellent, seven shillings, is awarded for each pupil taught, provided that (*a*) he has passed his fourth school year, (*b*) he has been taught for two hours a week during twenty-two weeks of the school year, (*c*) a register of attendance is

kept, (d) every boy in respect of whom the grant is claimed is a pupil of the day school in regular attendance.

All observations since the issue of these regulations show that the effect has been to extend Manual Training in England very considerably, and that the probable consequence will be its universal cultivation in English schools.

Lastly, in North America special attention has of late been paid to the question of Manual Training. There, too, advocates of the cause maintain that a certain degree of practical training is a necessary element of general education.

A knowledge of the fundamental rules of *Technik* in wood and iron, and the ability to apply that knowledge practically, seems to them such an excellent means for securing the independence of the individual, that they consider that no one who aims at perfection should neglect it. Nothing, they say, is so well suited to guard against empty speculation, nothing tends more to mental realisation of objects, and nothing shows the relation between theory and practice so vividly, as the training of the hand for the service of the thought.

Both in the Senate and in the House of Representatives of the United States of North America, it has been pointed out that the enormous allowance granted by the State towards universities and higher educational institutions is out of all proportion to the miserable provision made for the working and industrial classes. To test how far schools of industry and manual instruction benefit the latter, the North American Government, in last year's budget, provided a sum of about 24,000 dollars, and sent several experts to Europe in order to obtain information respecting manual instruction in Germany. But the practical Americans wanted not only vague information, but definite evidence, especially in regard to the results of the training as a preparation for industrial life. In order, therefore, to carry home definite details, they asked for statistics on all relevant matters, and the German Association expressed its willingness to assist them.

Many interesting particulars about Manual Training in

North America will be found in the *Arbeiterfreund*, 1890 (Fourth Quarterly Number, and 1891, First Quarterly Number, Berlin, Leonhard Simion). They show that the value of manual instruction is fully appreciated there, and that it is energetically promoted as an important means of education. It seems probable that some of the North American cities, owing to their freedom from prejudice, and the energy with which they throw themselves into the question, will soon obtain a measure of success unknown elsewhere.

The Report of the Munich Congress, 1888, already mentioned, gives more particulars of the position and character of manual instruction in Belgium, Denmark, Austro-Hungary, and Switzerland, in all of which countries it finds energetic support.

A number of other European and American countries, such as Holland, Italy, Luxemburg, Servia, Bulgaria, Chili, Argentina, and Uruguay, are beginning movements for the introduction of Manual Training. We may therefore say there is not a civilised country in which the idea of education for work has not been taken up. The development of this question in France, England, and North America is of the greatest importance to the cause in our own country. It encourages our natural wish that the German movement may find unprejudiced and appreciative acceptance, and thus be enabled to gain the victory over all opposition.

XI.

THE FUTURE.

Finally, the question suggests itself, 'What will be the probable course of Manual Training in the future?'

From the nature of the case, the subject must be pursued, as hitherto, in independent workshops and schools of manual dexterity. It is in them that we have gained our experience; in them the idea has taken shape, and methods of instruction

have been elaborated. But we cannot maintain that our task in this respect is finished ; much hard work remains to broaden and deepen the teaching of a subject which is still young. We must first perfect our system of method.

The next step will be the naturalisation, as it were, of educational work in the various 'Internate.' It is beyond all dispute that practical employment of some sort must find a place in such institutions, and that methodical training with purely educational aims should supplant the unsystematic production of goods for sale.

Further, we must undertake the extension of Manual Training to country districts, the expediency of which has been amply demonstrated by Von Schenckendorff's pamphlet, *Der Arbeitsunterricht auf dem Lande*. Fears have been expressed in many quarters that this attempt involves a relapse to the futile endeavours of the past. But such apprehensions are groundless. Whilst Manual Training in the country must adapt its tasks and its tools to country life, yet its basis will always be education. Our sole object would be to assist the development of the young by allowing them to exercise their powers in practical work. My only doubt is whether the attempt is not premature, whether we in Germany should not do well to wait a while before making it. In principle, however, there can be as little objection to manual instruction in the country as in the town. For if we find in the activity of the child a valuable, indeed indispensable, means of education, how can we justify the exclusion of country boys from its benefits ? Anxious opponents will do well to reflect that in other countries no such barriers are fixed to the spread of our work, nor has the growth always been from town to country. Sweden, the classic land of Manual Training, began with the country. It was in the country that Slöjd was first cultivated as a branch of national education ; thence, in the course of its development, it gained a hold on the urban communities.

I consider that the first consequence of the extension of

our manual instruction to the country would be an increase in the number of its departments by the inclusion of school-gardening. Objections to this inclusion on the ground of principle can hardly be advanced. The proper maintenance of a garden may be made of great educational value, especially in illustrating local geography and botany. Hence the success of the school-garden in Sweden and Switzerland, and in Austria, where the originator of the idea, Erasmus Schwab, was also the first to enter the lists on behalf of Manual Training. Regret has often been expressed that German schools hold aloof from an employment which elsewhere is followed with such zeal and evident success. Now the endeavour to extend manual instruction to the country obliges its promoters to admit gardening into their scheme. Not only does the general adaptation of the teaching to local circumstances demand this, but if country boys are to be educated through work for work, though they may be occupied in winter in the workshop, employment must be found them for the fine summer months, and that, as the habits of country-people require, in the open air. For the purpose gardening is the natural resource. And if cultivation of a school-garden makes its way from the country into our towns, and we come to add it in the fine season as a supplement to practical education, we shall welcome the addition, and be grateful to the cause of its appearance.

A question often heard in regard to the future development of Manual Training relates to its introduction into public schools. It has been repeatedly declared by the supporters of the movement that there is no immediate urgency, and that it is far wiser to perfect the methods of manual work outside the school than to press for its immediate introduction. Gymnastics were long carried on irrespective of the school. Why should not Manual Training also be independent of the school and conducted in the workshop? Not only is this possible, as the course of events hitherto shows, but absolutely requisite, if we are to develop

our methods without restraint. If, however, the future introduction of Manual Training into public schools and its probable direction must be discussed, I will venture to express my own personal opinion, and will indicate the line I anticipate will be taken. The first step, I believe, will be to introduce manual instruction for younger boys. In the lower classes there is not as yet such a multiplicity of subjects to be mastered as in the higher, and for elementary work only the simplest tools and cheapest materials are required. Other reasons will be found by reference to the chapter on 'Pupils to be taught.' The younger boys, having once acquired a zest for the work, would pursue it further, even if it were carried on, not as a school subject in the upper classes, but in special workshops. But will the school as a whole ever open its doors to Manual Training? I dare to hope so. The time will come when we shall take courage to drop much that is mere memory work, when a wide range of practical knowledge and well-assimilated experience will be more highly valued than any amount of abstract knowledge stored by memory alone, and when *doing*, with its power to educate the will, will stand side by side with *knowing*. The signs grow numerous that an educational revolution is in progress. Accomplished, it will make education and not instruction the centre of our school system. What the rising generation needs above all, is earnest and thorough education, and that manual work can be made an effective instrument of education we are very sure. But how, with all that we have now to teach, can time be found for a new subject? The answer is simple. We must reject the knowledge that is never assimilated and that passes away; we must proceed from intuition to abstraction, and not begin with abstraction, of which the child is not capable, or with simple appeal—to the memory. Further, we must bring together things that are related, German and history, history and geography, geography and natural history, that the conjuncture may lead to stronger

and more intense realisation of the idea that dictates it. Lastly, we must present the subjects of instruction in psychological order, according to the stages of development in the child. What but custom can account for the entire absence of gymnastics from the lowest classes in our schools, just as if the body of a child could not be trained as well as the mind? And how is it that the child is taught to write—that is, to imitate conventional characters—before it can distinguish or represent the simplest forms in drawing? It must indeed learn to read and write, but what psychological reasons can justify us in exhausting the didactic art that a child in its first school year may acquire the means of an intellectual intercourse of which it has as yet no notion and no need? Ought not the living language to be cultivated before the child is introduced to conventional symbols—written or printed—which lie outside the sphere of its interest? It would fain learn to know things, and we give it names; it wants intuitions, and we give it concepts; it longs to be active, to make, to fashion, and we condemn it to inaction and the passive reception of knowledge. I must, however, be content to see my opinions rejected because they are at variance with time-honoured usage. The future may bring, as I trust it will bring, an internal reformation of our school system, with victory, not for rights and privileges, but for psychological truth. But of one thing I am sure, that the thought that work is a serviceable instrument of education hitherto unappreciated, will never again pass away. Sound ideas which assist the progress of mankind are tenacious of life. That this idea will survive is assured by the fact that this time it has been, not merely theoretically approved, but practically realised in a highly developed form; assured, too, by the wide spread of its influence and its enthusiastic reception in all civilised lands, whose rivalry bids it live. It is a hopeful sign when the ideal wishes of the pedagogue coincide with the wants of real life. Life demands from the school the training of hand and eye, demands that the

education of the child shall be harmonious and many-sided. Such a claim gives us confidence that the cry for education *through work to work* will not die away unheard. Though dull prejudice and humdrum routine oppose our cause with the weapons of indifference, we shall not tire in the struggle to uphold it.

And the future will show to whom victory is to be.

No more theories
Material for 3D & 2D.
paper folding, and others - explore

XII.

GENERAL LITERATURE OF MANUAL INSTRUCTION.

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